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The Sherardizing Process Illustrated

The Coating of Electrical Conduits with Zinc in the Plant of the National Metal Molding Company, Economy, Pa.

Although the process of Sherardizing, or dry galvanizing, is being widely used in the rust-proofing of steel and iron products with zinc, few users of Sherardized materials are familiar with the process or methods employed in its application. This is in part due to the fact that Sherardizing, unlike either electro or hot galvanizing, was not developed by successive steps over a period of years, but was discovered during experiments with an improved process of annealing castings, by Sherard Cowper Cowles, a well-known English engineer, and named for him—Sherardizing. It is doubtful if the process would be in use today save for some such discovery, as the formation of the zinc-iron alloy obtained in it occurs at a temperature below the fusing point of either metal, a feature having no parallel in established phenomena, it is believed, save, perhaps, in the Bauer-Barff or Wells processes.

A clear idea of the manner in which Sherardizing is carried out may be obtained from the illustrations accompanying this article, taken in the plant of the National Metal Molding Company, at Economy, Pa. This company employs the Sherardizing process in protecting electrical conduits and fittings which it manufactures.

The tube from which this company's conduit is made is first cleaned by acid pickling and scouring in a manner similar to that used for preparing articles for electro or hot galvanized coatings. It is

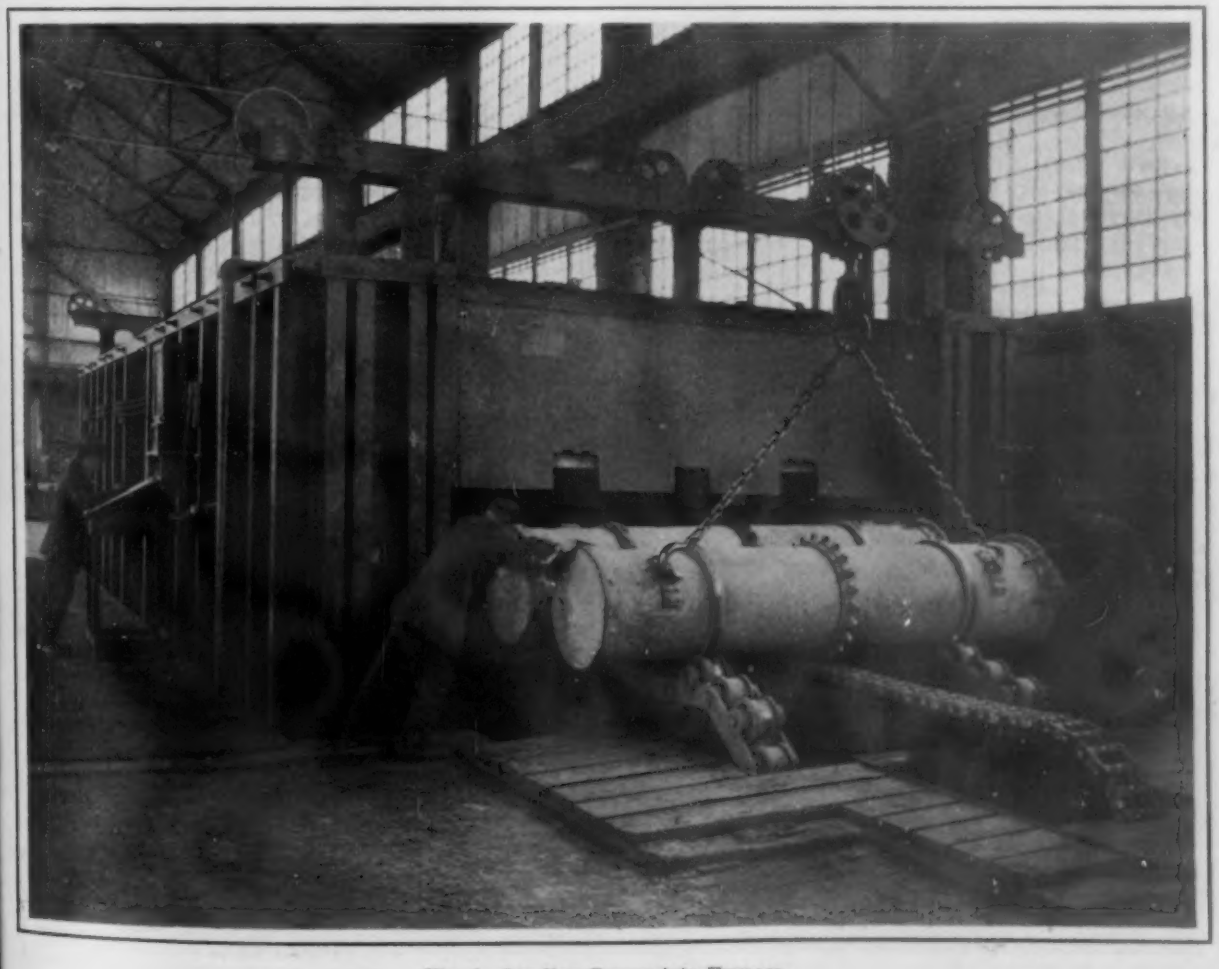


Fig. 1—Loading Drums into Furnace

Fig. 2—Chuting Dust Through Funnels into Sherardizing Drums

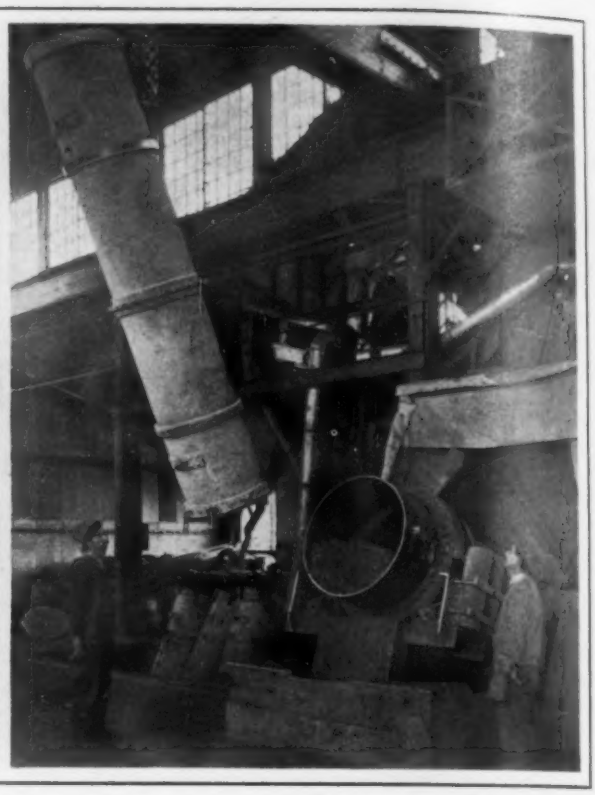


Fig. 4—How the Surplus Zinc Dust Is Shaken Out in the Rocker

then loaded into large drums into which zinc dust is discharged through funnels into and around it, in the manner shown in Fig. 2, until the drums are filled. The dust used is obtained from the hoods of zinc smelters, upon which it is formed by the condensation of zinc vapors, and it is not ground commercial zinc, as has been erroneously stated. The dust usually contains about 85 per cent. pure zinc and 10 per cent. of zinc oxide, which latter is not in a free state, and, being evenly distributed throughout the mass, prevents the dust from becoming pasty at the high temperature required for Sherardizing.

After loading, the drums are sealed and rolled into the Sherardizing furnace, as shown in Fig. 1. Here they remain for 5 to 6 hr., according to the tonnage that they contain, in an evenly maintained temperature of 780 deg. F. Many theories have been advanced as to the probable action incident to the formation of the Sherardized zinc-iron alloy during the period the drums remain in the furnace. These theories, however, do not check up in some details, and the only point on which investigators are entirely agreed is in the conclusion that articles properly prepared, buried in zinc-dust of the character used and maintained at a certain temperature for a correct period of time are provided with a homogeneous zinc-iron alloyed finish of high efficiency.

Upon removal from the Sherardizing furnace the drums are rolled out on the cooling platform, as shown in Fig. 3, and allowed to cool out, as it is called, for 12 to 16 hr. before they are unsealed, as the introduction of oxygen to the zinc while in a

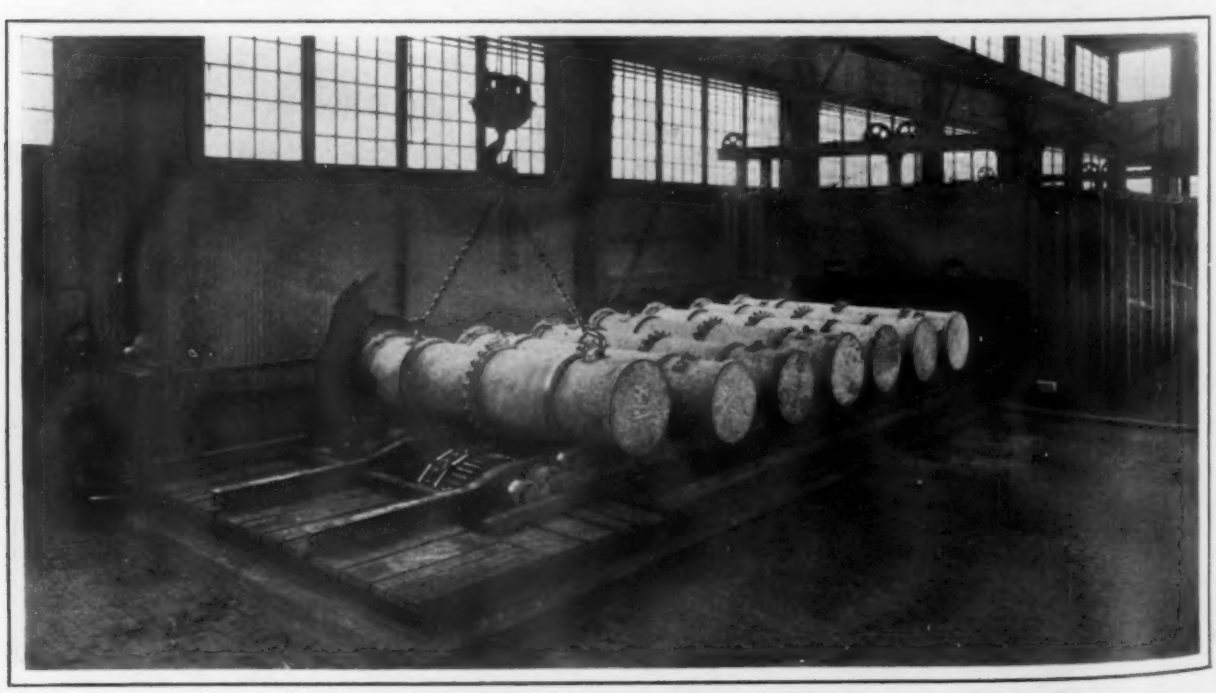


Fig. 3—Drums Cooling Out After Removal from Furnace

superheated state would, of course, destroy it. The annealing incident to the slow heating and slower cooling through which articles pass in the process makes Sherardizing doubly valuable as a finish for steel products which, like electrical conduits, must be bent during installation, and for many cast-iron articles which would otherwise require a separate operation for the purpose.

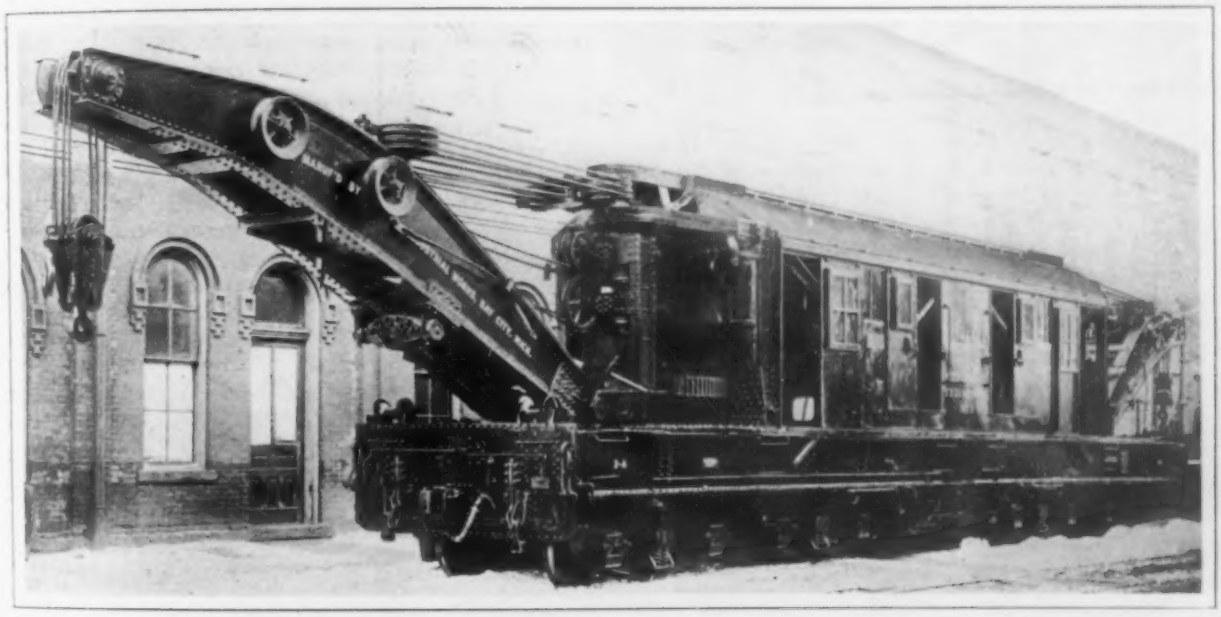
After "cooling out" the contents of the drums are dumped into large hoppers, as shown in Fig. 4, and the surplus zinc dust rocked out, leaving, in addition to the zinc-iron alloy, an exterior coating of zinc.

The United States patents covering the process of Sherardizing are owned by the United States Sherardizing Company, New Castle, Pa.

AN ELECTRIC TUNNEL CRANE

A Double-End 100-Ton Self-Propelling Unit Designed for Underground Work

The Industrial Works, Bay City, Mich., has designed and built a 100-ton tunnel crane for use in case of accidents or wrecks within the electric division of the New York Central & Hudson River Railroad. It is a double-end electric wrecking crane with independent 100-ton capacity cranes at each end and the whole apparatus was especially designed for the underground clearances and conditions existing in the Grand Central Terminal, at New York City. While designed primarily to meet the conditions existing at that point, the crane is also adapted for use on the main line, and may be dispatched at high speed under its own power to the scene of an accident occurring anywhere on the electric division.



The Wrecking Crane Which the New York Central Is to Use in the Electrified Zone, New York

The functions of a crane are combined with many of those of a high-power electric locomotive, and the equipment provides for high-speed independent operation and includes airbrakes, whistles and the necessary fittings. In the restricted space of the express level deck of the Terminal, the capacity of the crane must be available under conditions where headroom for raising the boom and room at the side for slewing are both restricted, and excessive concentration of wheel loads must also be avoided. In case of a wreck occuring in the terminal or the adjacent tunnel, it is planned to lift the wreckage clear of the track and have the crane back out with the load. If, however, this cannot be done, by reason of the lack of headroom or the size of the piece, one end will be raised with the main hoist and a special truck placed underneath it with the auxiliary hoist, after which the load would be dragged away.

The crane is massive. The car body is 67 ft. long, with a wheelbase of 51 ft. A system of air-operated, telescopic outriggers or jack beams, which are used to add stability during heavy lifting and to distribute the load over a greater area, is furnished. Valves with lever control regulate the movement of these outriggers, and the operation is said to be instantaneous. A complete, independent crane, with a mast and boom of structural shapes, is located at each end of the car.

Four 200-hp. motors are used for propelling the crane, controlled from either end of the car. Two 150-hp. motors are employed for hoisting and for operating the machinery. The propelling motors are directly connected to the axles of the compound trucks, two at each end of the car, and are arranged so that all four may be used for traveling or only the two at either end, if that is desired. With all four propelling motors in use, the crane may be used to haul an 80-ton rolling load at a speed of 25 miles per hr. on straight level tracks, or 12 miles when an additional load of 50 tons is suspended from the crane. The motors are designed to operate on a direct-current circuit, where the line voltage varies between 300 and 750 volts. For intermittent and emergency service, as when the third rail is out of commission, or it is impossible to make cable connections with a feed line, a storage battery is installed on the crane.

The annual report of the Steel Company of Canada, Hamilton, Ont., shows that the 12 months ended December 31, 1913, were the most prosperous it has ever had. An analysis of figures indicated that the new Canadian tariff would tend to benefit the company. The following officers and directors were elected: President, C. S. Wilcox; vice-president, C. A. Burge; vice-president and general manager, Robert Hobson; secretary-treasurer, H. H. Champ. Directors, Charles Alexander, Providence, R. I.; W. D. Matthews, Toronto; John Milne and William Southam, Hamilton, Ont.; Edmund Osler, Toronto; F. H. Whitton, William Gibson and Lloyd Harris, Brantford, Ont.

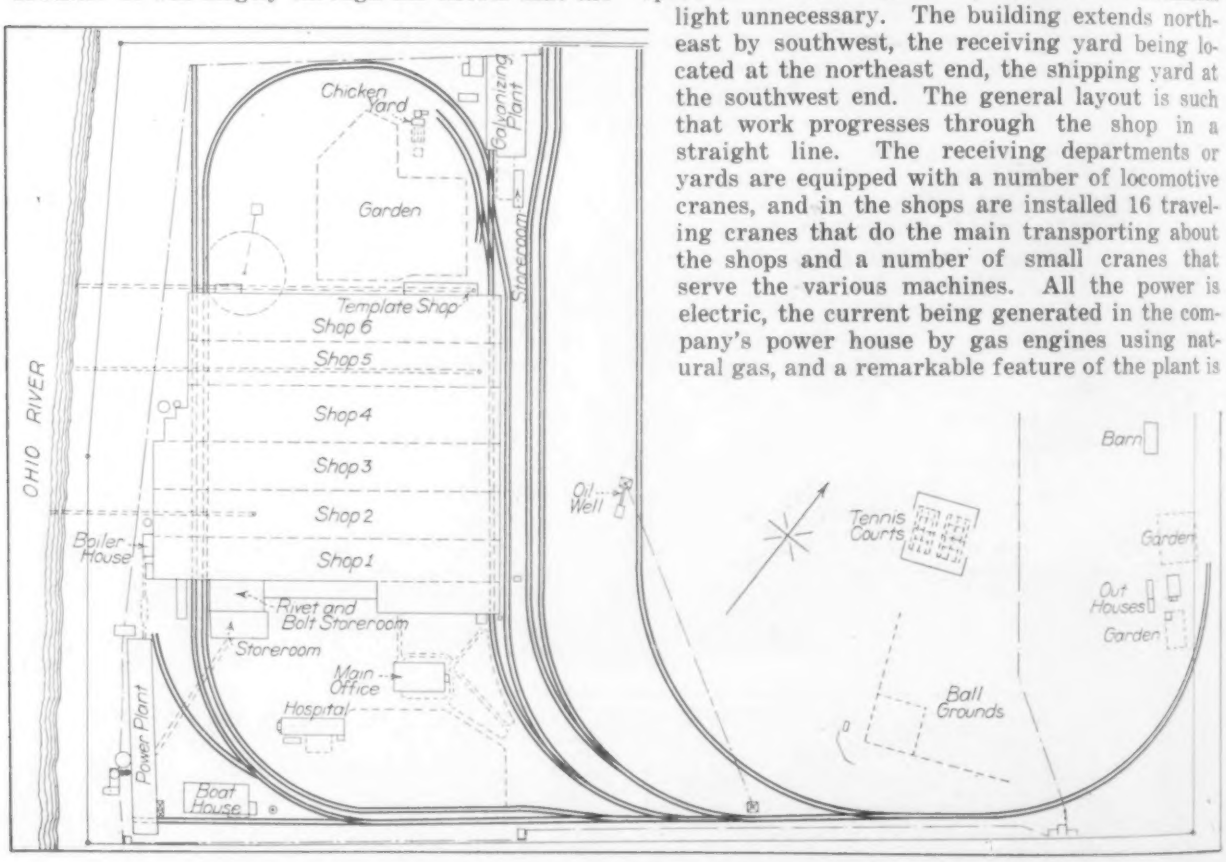
A Modern Steel Construction Shop

Plant of the Riter-Conley Mfg. Company, Equipped for Building Plate Work in Variety as Well as General Structural Work

Nearly fifty years ago, James Riter started a small shop at 56 Water street, Pittsburgh, to do a general plate and tank business, and from this small beginning has grown the present large plant of the Riter-Conley Mfg. Company, which is now located at Leetsdale on the Pittsburgh, Fort Wayne & Chicago railroad, about 15 miles from Pittsburgh. By a recent addition of two large bays to its extensive plant, the Riter-Conley Company now has the distinction of having the largest fabricating shop in this country combining plate and general structural work. The initial business in Pittsburgh was carried on for a few years by James Riter and was taken over by Thomas B. Riter, a brother. It was largely through his efforts that the enviable reputation of this firm was established, first as Riter & Conley, later as the Riter-Conley Company, and about 12 years ago was made a corporation under the name of the Riter-Conley Mfg. Company.

From its inception the business grew rapidly, necessitating larger quarters, and these were secured by the building of additional shops on Ferry street in Pittsburgh. Later a structural shop was established on Preble avenue, N. S., Pittsburgh, and finally a plot of 70 acres was secured at Leetsdale. Upon this tract the plant and general offices of the company are now located, the Pittsburgh and North Side properties having been disposed of and the entire works removed to Leetsdale. The advantage of the present location is its proximity to the Conway freight yards of the Pennsylvania Lines West, where through trains for both the East and West are made up, and plenty of cars are usually available. The Pennsylvania Railroad has an extensive system of tracks connecting with its main lines into the works, and the Riter-Conley Company has its own switching equipment. A frontage of 1400 ft. on the Ohio River affords excellent shipping facilities by water.

The present plant except the office, power house and galvanizing department, is all under one roof and covers an area of 360,000 sq. ft. The plant is divided into six bays, ranging from 77 ft. 3 in. to 85 ft. 6 in. in width, and are known as shops 1 to 6 inclusive. They are lighted by abundant window space in the walls and roof, which make artificial light unnecessary. The building extends northeast by southwest, the receiving yard being located at the northeast end, the shipping yard at the southwest end. The general layout is such that work progresses through the shop in a straight line. The receiving departments or yards are equipped with a number of locomotive cranes, and in the shops are installed 16 traveling cranes that do the main transporting about the shops and a number of small cranes that serve the various machines. All the power is electric, the current being generated in the company's power house by gas engines using natural gas, and a remarkable feature of the plant is that there is no coal used except in the blacksmith fires.



General Map of the Plant of the Riter-Conley Mfg. Company, Leetsdale, Pa.

Shop No. 1, covering an area of 77 x 635 ft., takes up one bay of the main building. This in conjunction with No. 2 shop, 85 x 638 ft., is devoted mainly to blast furnace, tank, pipe work and miscellaneous plate fabrication. The tool equipment is very complete. The material enters at the north end, passes first through the shearing and punching machines from which it goes to the assembling and riveting floors. A long rack punch with automatic feed for punching holes on each side of a plate will handle plates 32 ft. long. This machine, designed by the Riter-Conley Company, may be set to punch holes at any predetermined distance apart. A multiple punch is provided for punching ends of tank and pipe plate, this machine having a capacity

Horizontal and Vertical Rolls

for punching at one stroke 100 holes ¾ in. in diameter in ¾-in. plates 8 ft. wide.

There is a combination multiple punch and shear, a Long & Alstatter bulldozer for bending bars and angles, and a Long & Alstatter center punch and shear. A special machine provides for scarfing plates cold. For bending plates a set of 21-ft. horizontal bending rolls is installed, and a set of vertical rolls can take care of plates 8 ft. in length by 1¾ in. in thickness. A Niles-Bement-Pond 35-ft. planer is installed in this department, and is one of the largest ever built. This machine is driven through a large spur gear reduction by a 100-hp. motor. The pipe bending rolls have a capacity for bending pipe 90 in. in diameter. The plate drilling department in No. 1 shop contains six radial drills with 6-ft. arms, three being of the Bickford type and three built by Prentice Brothers. The equipment also includes the usual array of heavy bull riveters. The largest of these is designed to rivet pipe 30 ft. long and 7 ft. in diameter, with continuous butt strap assembled complete. Some of the tank work is welded, and for this purpose there is provided two heavy oxy-acetylene welding devices, one furnished by the Linde Air Products Company and the other designed by the Riter-Conley Mfg. Company.

The company makes many of its own rivets and rivet making machines are installed in an annex to No. 1 shop. The cold header machines were furnished by the Waterbury Farrel Foundry & Machine Company and have a capacity of 30 rivets per minute for sizes ranging from ½ to 1⅜ in. in diameter. A smaller machine has a capacity of 60 rivets per minute for sizes under ½ in. in diameter. The raw material for the rivet shop is first run through the pickling and washing solutions and then to the draw bench where it is drawn to exact size before cold heading. The raw material ranges in size from ¼ to 1⅜ in. in diameter and is reduced

Shops Nos. 1 and 2, Plate Department

The No. 4 Shop

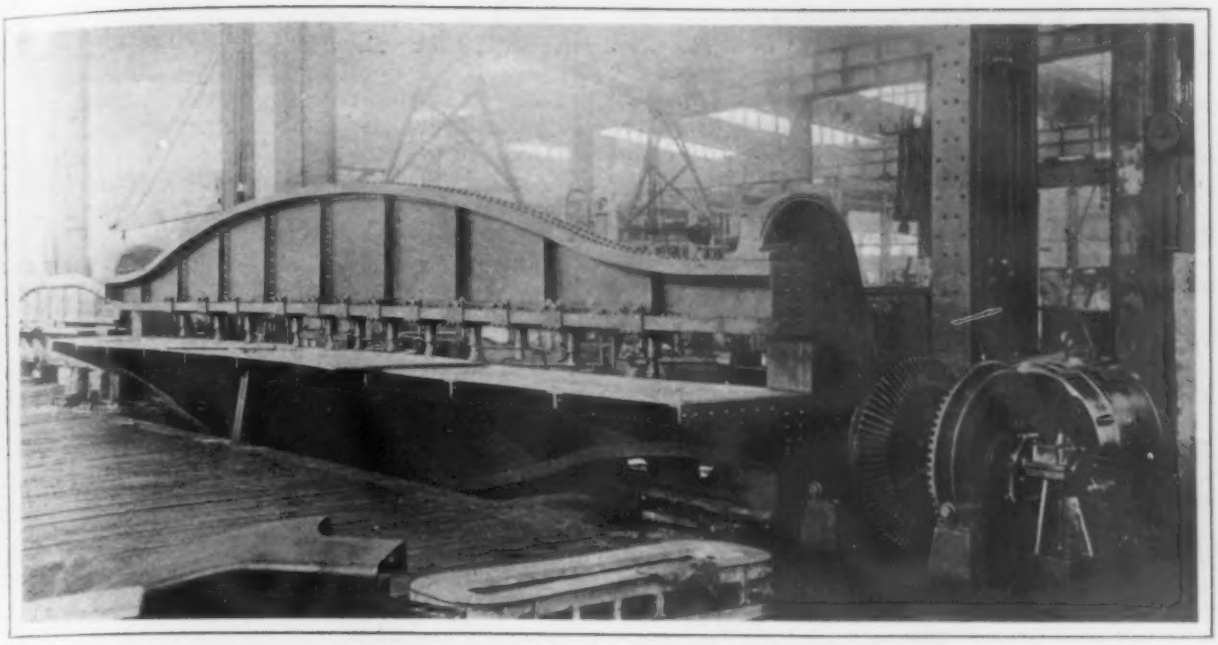
1/32 in. by drawing. This department also contains bolt heading machines and a rotary gas heated annealing furnace for rivets and bolts with a capacity of 8 tons per day.

A good deal of fine plate work turned out by the company is cold riveted, for which purpose powerful machines are required. The company has designed its own cold riveting machines. The operator simply pulls a lever which releases a plunger that upsets the head of the rivet. The machines are so designed that when a predetermined pressure has been reached a release valve is opened and the plunger moves back. Therefore each rivet is driven with the same pressure and unequal strains are avoided.

The machine shop occupies the northeast ends of No. 2 and No. 3 shops and has some very efficient tools, embracing 15 lathes, 5 planing machines, 6 milling machines, 1 planer-type milling machine, 2 hydraulic bending rolls, 2 vertical boring machines, 4 cylindrical grinding machines, 3 surface grinding machines, 5 radial drilling presses, besides a number of other small tools.

In shop No. 3, covering an area of about 85 x 638 ft., is located the forge shop, which contains a large amount of machine tool equipment, hydraulic presses, forging hammers, annealing ovens, etc. There are four steam hammers, two of 6000 lb. capacity, two of 2000 lb. capacity, an Ajax header, a Billings & Spencer drop hammer, and a large trimming press built by the United Engineering & Foundry Company. The steam hammers are operated by compressed air. A notable piece of equipment is a hydraulic press of 5000 tons capacity designed by the Riter-Conley Mfg. Company and built by the Bethlehem Steel Company. The Riter-Conley Company makes a large number of steel cores for concrete piles. The plates for these cores are

Shops Nos. 5 and 6, Structural Department



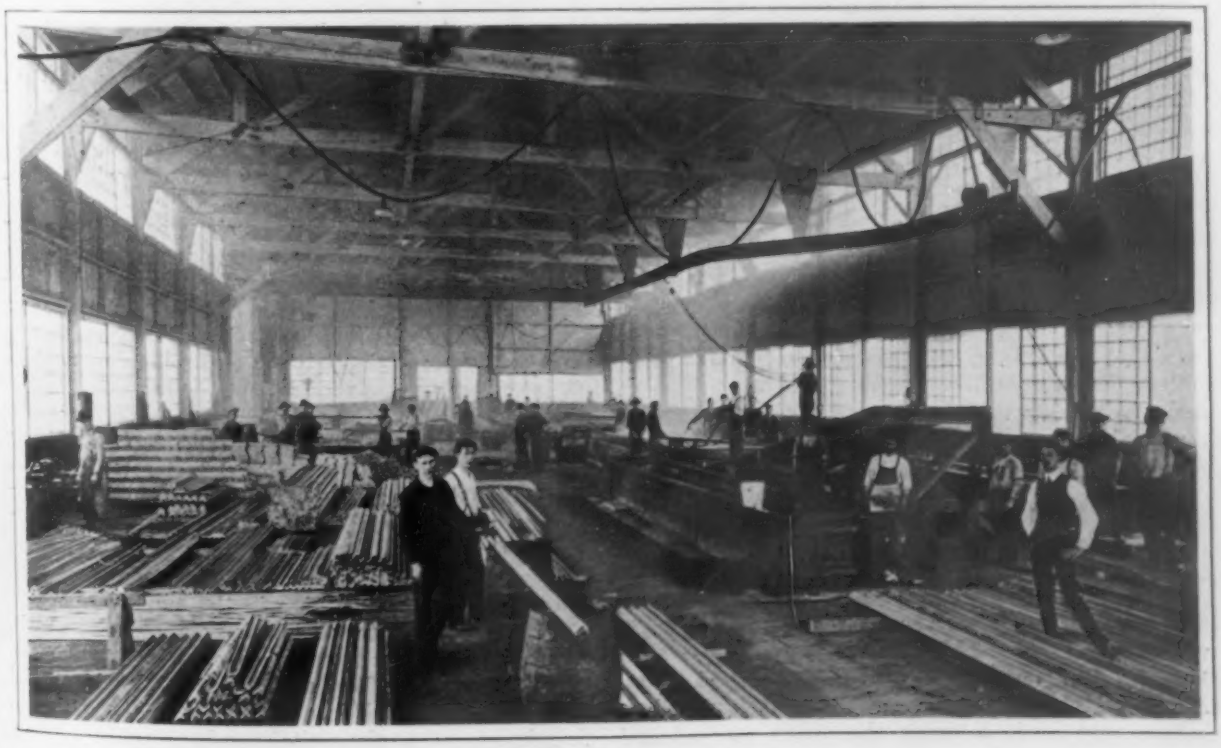
A 40-Ft. Planing Machine in the Gas Holder Department

formed under this press. The gas fired annealing furnace is of such size that it will take riveted pipe sections 30 ft. long and 8 ft. in diameter. There is also a 400-ton Chambersburg Engineering Company press, a plate heating furnace, 15 x 20 ft. in size, and 4 heating furnaces for drop forge and general smith work.

The No. 4 shop, 85½ x 616 ft., is devoted exclusively to the building of gas holders of which the Riter-Conley Mfg. Company makes a specialty. The company first took up this work in 1896. About that time water gas had come into extensive use and up to that period red lead was used exclusively for making tight work. As it was found that the oil in the gas attacked the red lead causing all the holders to leak badly, the Riter-Conley Company determined on erecting gas holders with metal to metal joints caulked in the same manner as ordinary boilers and similar construction, to make tight work. The use of copper steel in gas holder construction has proved a very effective agent in withstanding corrosive action.

The equipment in the gas holder department necessarily includes machines designed for heavy plate fabrication. This plate work has to be very exact, the material being worked down to the one hundredth part of an inch. There are installed 11 drilling machines of various makes with 5-ft. radials and a 40-ft. plate edge planer of Riter-Conley design and two hydraulic presses, one of 600 tons capacity and one of 1000 tons capacity. There are also two vertical and one horizontal center punching machines, one multiple punch, one gate shear for shearing light holder shapes and two rack punches with a capacity of handling plates 20 ft. in width.

Shops Nos. 5 and 6 are of recent construction, each being about 85 x 572 ft., and are devoted solely



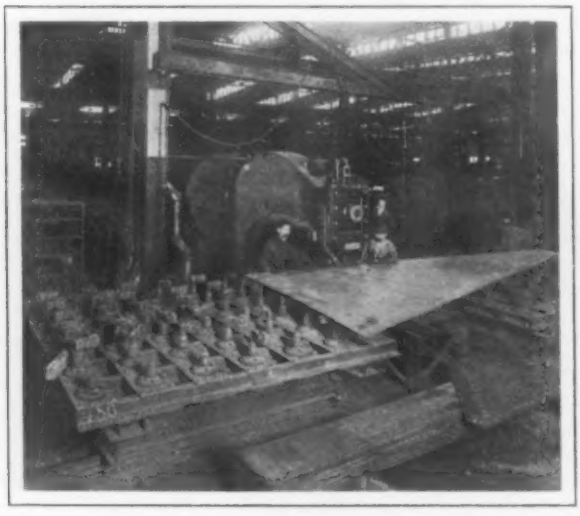
The Galvanizing Department

to structural work. Suitable equipment for heavy bridge and building fabrication has been installed. They contain a Long & Alstatter gang punch for punching columns and girder work, two punches for bars and angles, one set of straightening rolls for straightening columns and girder plates and two vertical center punches.

There is a very large vertical center punch for punching plates which is equipped with a ball-bearing caster table, so the plates can be handled to best advantage. There is also a gang of 4 drill presses, 9 column reamers, 3 rivet gantries electrically operated, 2 rotary compressors, 1 end shear, and a cold saw with a capacity for cutting 30 in. beams. Other equipment consists of an angle shear, center punch for punching angles, one gang of 4 center punches especially designed for punching tower angles, 3 combination shear punches, 1 coping machine, a large rotary planer, bulldozer, and 2 stationary riveters. A large number of transmission towers are fabricated in the structural department. In order to handle this work expeditiously, a battery of 4 motor-driven punches, mounted on an adjustable rack, has been provided.

The borings and punchings are collected in steel boxes which are handled by the traveling cranes. The boxes are 3 ft. wide, 4 ft. long and 3 ft. deep. A scrap pit is located at the southeast corner of the plant, in which the borings and punchings are accumulated, and then from time to time as the larger boxes are filled they are lifted by a locomotive crane and dumped into a gondola car.

The galvanizing plant is housed in a separate building 71 x 176 ft. just north of the main building indicated on the accompanying general plan of the works. It is used largely for providing a protective coating for transmission towers. It is furnished with ample equipment including suitable cranes, one pot, three pickling tanks, one wash tank



Center Punch with Roller Table, Structural Department

and one drying table. Its capacity is 30 tons of material per day.

All the power throughout the plant is electric, shops Nos. 1 to 4 being run by alternating current and Nos. 5 and 6 by direct current. The power plant is contained in a fireproof building 48 ft. wide by 324 ft. long. It includes some of the largest natural gas units now in service for generating electric power, four 200-kw. three-phase Westinghouse vertical direct-connected natural-gas units and four 175-kw. direct-current Westinghouse belted units. A synchronous motor generator set is installed to balance the loads between the direct current and alternating current equipment. The air equipment consists of one Snow pump with a capacity for delivering 2200 cu. ft. of free air per minute, three gas engines belted to compressors, two with a capacity of 750 ft. of free air per minute, and one with a capacity of 800 ft. of free air per minute. There is installed one electrically driven water pump and a gas driven Wilson-Snyder pump, which pumps the water from the Ohio River which is used throughout the entire plant.

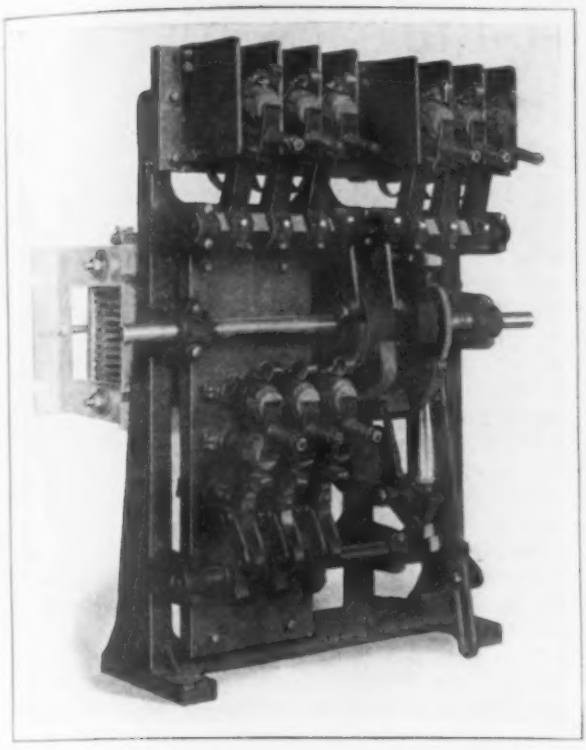
The Riter-Conley Mfg. Company in laying out its plant was not unmindful of the comforts and conveniences of its employees. The company makes special effort to keep the grounds in as attractive a condition as possible. The main office, which is a 4-story brick and steel structure, is surrounded by flower beds and carefully kept lawns. Facing north and between the shops and the Fort Wayne railroad there is a very large piece of ground on which a base ball diamond is laid out, also two tennis courts, quoit grounds and putting greens. These facilities for recreation are placed at the disposal of all of the employees of the company. The vacant space north of No. 6 shop, which has been left to provide for future expansion, is now occupied by a garden supplying vegetables used in the company's dining room. The company maintains a relief department, taking care of all injured employees without any charge, and the men who are off duty on account of injuries are paid half time. The company also maintains a hospital for taking prompt care of its men in case of accident. A notable feature of the plant is that all gas, air and water lines in each of the six shops in the main building are laid in trenches, constructed of brick walls with a steel plate covering, and serve as general walks throughout the shops, and no materials of any kind are allowed to be piled on these plates.

The plant of the Riter-Conley Mfg. Company is one of the best equipped and largest works in the world for fabricating miscellaneous plate and structural work. It has been conspicuous in the building of blast furnaces and in addition to gas works complete, it builds and launches river boats, constructs electrical transmission towers, makes the largest plate girders for railways or viaducts, manufactures cold storage plants and complete steel plants and applies steel plates and shapes to every required use. Special emphasis is placed on turning out complete industrial plants from the designs to placing the plant in operation.

A Mechanical Type Elevator Controller

A new mechanical type of elevator controller for use with polyphase alternating-current motors has been designed by the Cutler-Hammer Mfg. Company, Milwaukee, Wis. This controller, which is an addition to the line of alternating-current automatic and semi-automatic elevator controllers now made, is intended particularly for use in factories, industrial plants, etc., where alternating-current power is purchased from a central station, and there is no electrician or engineer available to make adustments. The controller has no electromagnets or sliding contacts and is arranged to be operated from the car by a rope or lever. It is emphasized that the controller operates satisfactorily on circuits where there is a wide fluctuation in the supply voltage.

Two sets of three single-pole switches each, equipped with arcing shields, control the primary circuit. Each of these sets is operated by a special internal cam, which is relied upon to give an absolute knock out to the switches when opening and an absolute lock out for the second set, when the first



A Full Mechanical Type of Elevator Controller Designed for Alternating-Current Motor Equipments in Factories, Industrial Plants, Etc.

is thrown in. Three triple-pole cam-operated switches cut the secondary resistance out of the circuit. As soon as the primary switches are thrown in, a clutch is released which permits a weight to drop, the motion being retarded by a suction dashpot. This weight in turn drives a shaft on which the cams are mounted for controlling the secondary switches. The secondary resistance is cut out simultaneously in all three phases of the rotor circuit, which, it is pointed out, gives a balanced condition at all times. When the primary switches are opened, the secondary resistance is again inserted in the circuit, and there is a latching attachment to prevent the controller from being operated accidentally if the operating mechanism is not thrown to the central position. The contacts in the controller are the same throughout, which simplifies the renewal of the parts subjected to wear. A wide range of adjustment is provided for the contacts, which tends to secure maximum life. An accurate indication of the positions of the controller handle is furnished by a notched star wheel.

The Dodge Mfg. Company has opened Southwestern sales and engineering offices at Dallas, Tex., and a distinct sales and engineering office at Grand Rapids, Mich. J. H. Drapier, of the general sales department, Mishawaka, has been made manager of the Dallas addition and Oscar W. Gregg, late of the Gilbert Pulley Company, representative at Grand Rapids. A short thime ago the company opened an office at Indianapolis in charge of E. M. Carver. Branches and warehouses are maintained at Chicago, New York, Boston, Pittsburgh, Philadelphia, Cincinnati, St. Louis, Minneapolis and Portland.

The Van Dorn & Dutton Company, Cleveland, Ohio, announces that to further its interests in the far West, particularly in the electric traction field, it has established branch offices in Los Angeles and San Francisco. At the former point the office is located at 1007 North Alameda street, and in San Francisco at 515 Mission street. In charge of the Los Angeles office is H. E. Borland, while the San Francisco office is in charge of W. B. Wilson, district sales manager.

A New Silent Tilting Tumbling Barrel

The engineering department of the Warner Brothers Company, Bridgeport, Conn., has placed on the market a machine known as the silent tilting tumbling barrel. It is designed for polishing and grinding small stampings, forgings or castings, and for the wet or dry rolling of plated stampings, which latter process is fast replacing hand burnishing.

The machine is driven by a single pulley, which has an internal expanding friction clutch. This clutch is operated by a lever located close to the tilting crank that controls the barrel, thus giving the operator control of all the mechanism of the barrel from one working position. The power is transmitted through a case-hardened steel worm and a cast-iron gear running in an oil bath, which is relied upon to insure silent running. The moving parts are inclosed in dust-tight housings, and this construction with the resulting elimination of dust and grit in conjunction with the silent running tends to reduce the wear to a minimum. The barrel is self-oiling throughout.

The barrel can be tilted to run at any angle between the position shown in the accompanying engraving and one at an angle of 180 deg. from it. A slight pull of the crank handle disengages the pawl, and a moderate effort of one hand tilts the barrel. When the handle is released the pawl automatically locks itself, and it is emphasized that in this way no accident can result from a flying handle, nor can a falling tub spill its contents on the floor. No gears are exposed, and the workman is protected against accidents. The load of the barrel is carried by a ball thrust bearing.

Two types of barrel are furnished. A cast-iron or brass barrel of polygon shape is substituted for a steel one in grinding and polishing stampings, forgings or castings. Maple barrels are used for the wet or dry rolling of plated stampings and similar work. Three sizes of barrel are made,

View of the Operating Side of the Barrel Showing It in the Lowest Position

having inside diameters of 28, 32 and 36 in. at the bottom, and 23, 27 and 30 in. at the top. The length of barrels are 26, 28 and 30 in. The barrel having the smallest dimensions is considered the standard size by the maker.

The American Metal Company, Ltd. (Metallurgical Company of America), has removed its offices to 61 Broadway, New York.

Two Remodeled Blast-Furnace Plants

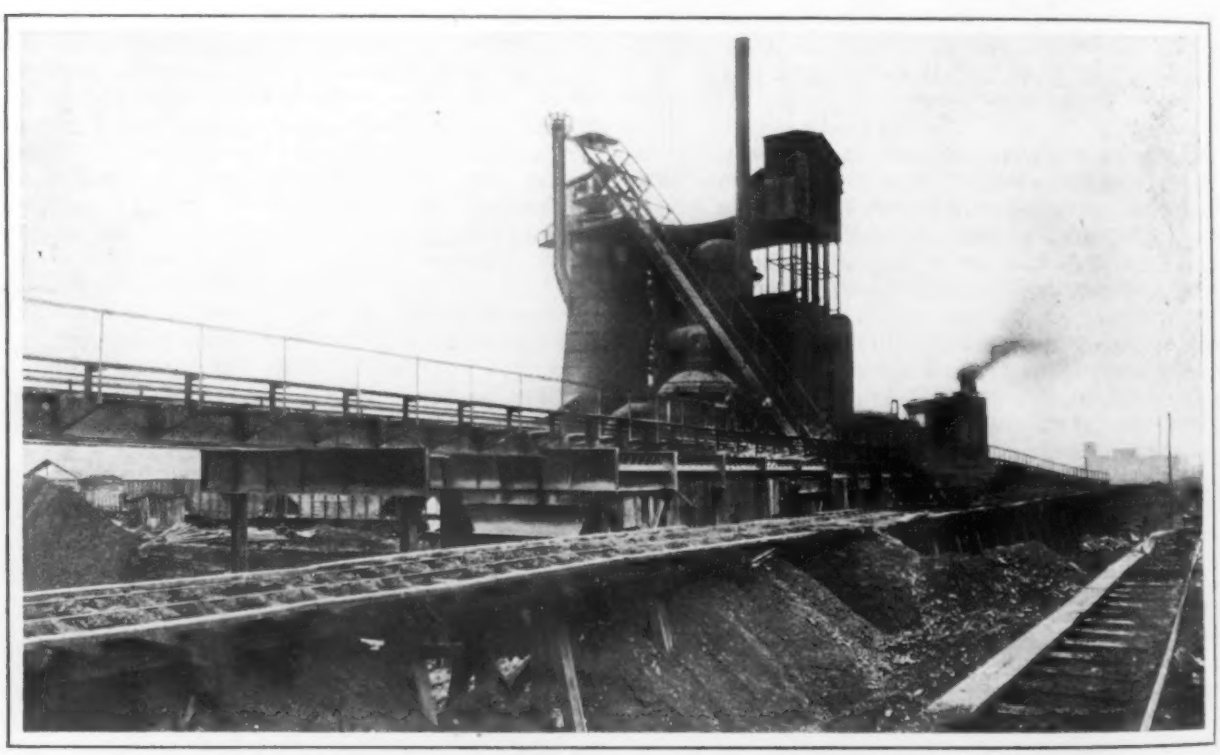
How Changes Were Made at the Etna and Ironton Plants of the Marting Iron & Steel Company, Ironton, Ohio

The Marting Iron & Steel Company, Ironton, Ohio, has installed a simple and inexpensive stock charging installation at two of its plants in Ironton. The Etna plant comprised two alternate stacks with a connecting platform leading to a double vertical hoist. These stacks, as originally built by English engineers, had vertical shells of very light iron. It was decided to eliminate the alternate principle on which they were operated and reconstruct one of the stacks on modern lines. With this in view, one of the stacks was equipped in 1910 with a new shell of ⅜-in. steel plate, the other stack being left as originally built.

To equip the modern stack with a skip, it was necessary to lay off the center line of the skip bridge at 10 deg. with the center line of the furnace in order to clear the hot blast stove located between furnace stack and stock house. The old wooden trestles, three in number, extended in a direction parallel to the center line of the two stacks. A new double track trestle with stock bins was constructed in line with the old wooden trestles and between them and the furnace, running through the old stock house, which was removed to accommodate them. This arrangement contemplated running the center line of skip bridge and skip pit at 10 deg. with a line square with the center of the new trestle and bins.

For reclaiming the ore so far as possible directly from the old trestles, the new trestle was constructed within working distance for a locomotive crane from the first old trestle. The ore track on the new trestle adjoins the first old trestle. On this ore track the transfer car operates. With the aid of the locomotive crane this car, therefore, commands all the reserve ore under the two tracks of the new trestle, all the ore under the first old trestle adjoining the new trestle and practically 50 per cent. of all the ore under the second old trestle. The ore under the third old trestle and the remaining 50 per cent. of the ore under the second old trestle can be loaded into the transfer car by handling twice with the locomotive crane or by loading directly into hopper cars from these trestles and switching these cars over the bins.

At the Etna plant, the new alternate stack was available for immediate installation of complete automatic filling devices, and it was planned that the older stack would be maintained in blast during part of the reconstruction period. At the Ironton plant the plan was to keep the furnace in blast continuously throughout the entire construction period and only add to the previously existing layout, trestles and bins to be used in connection with hand filling. This left the installation of a complete automatic filling apparatus until a later date when the furnace would be available for such installation. The ore yard at the Ironton plant is in many respects similar to that at the Etna plant, and the same bin filling scheme was adhered to. However, the future skip will be constructed on the center line of the furnace at right angles to the new trestle, this arrangement contemplating the removal of the present vertical hoist.



New Skip Hoist at Etna Plant, and New Trestle, Showing One of the Suspension Type Bins

EQUIPMENT AT ETNA PLANT

A steel trestle construction of variable hight was provided with an overall distance including the bins of 510 ft. The hight of the trestle measured above the stockhouse floor level at the abutment is

14 ft. and 23.58 ft. at the first bent of the coke bin adjacent to the abutment, the grade between the points mentioned being 4.2 per cent. Beginning at the end bent of the ore bin farthest from the abutment, the hight of trestle tracks at top of rail is approximately 26 ft., and at the extreme end of trestle 30 ft., providing a grade of 1½ per cent. This grade is also maintained over the stock bins.

Eleven ore and stone bins of the Baker suspension type, of an average capacity of 110 tons of Mesaba ore each, were provided. The center to center dimensions for bins are 12 ft., and average hight is 25 ft., as measured from yard level to top of track rails. The approximate average width as measured at the top of the bins and at right angles to the center line of track is 20 ft. The Baker type of bin construction as adapted to this installation was illustrated and described in *The Iron Age* of October 23, 1913. Some of the details of construction are here shown. The bins deliver through quadrant gates into a scale car running the entire length of bins, which in turn delivers into the skip car chutes at the skip pit between the scale car tracks.

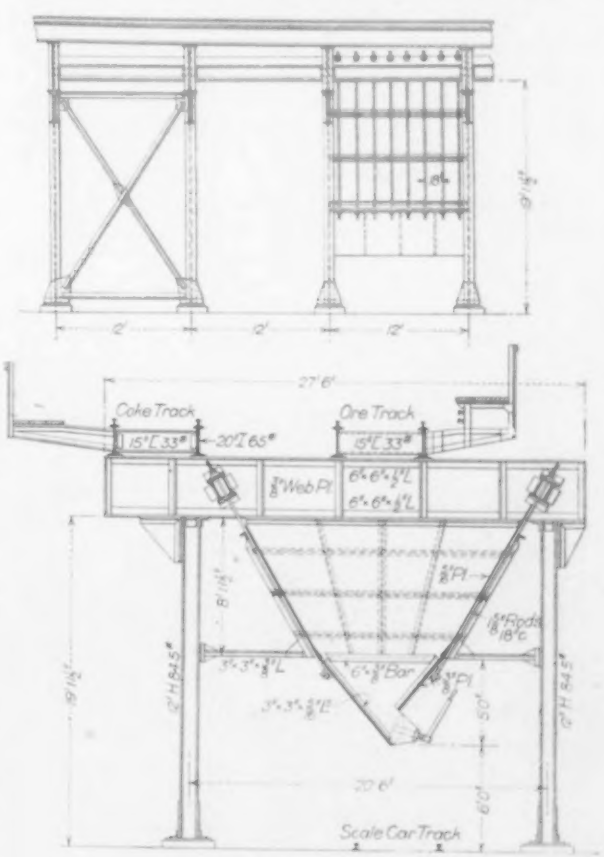
A double discharge coke bin 60 ft. long, spanning the two tracks of steel trestle and having an average hight of approximately 24 ft., was provided. The bin was constructed with sloping bottom sides, converging to two oppositely located discharge doors provided with chutes and gates, the location of the chutes being such that materials may be discharged directly into skip cars. The bin is supported by four steel bents which also support the railroad tracks.

One electrically operated 60,000-lb. transfer car, the general construction of which is given in an accompanying drawing, was furnished. This car is of the McKee type, but departures over the old style were incorporated. The old method of flared hopper was changed to flat hexagonal shaped sides. The tripping of the hinged discharge doors is accomplished by means of lever and bell crank, located on the center line of the hopper, which in turn are actuated by means of a system of shafting and bevel gears leading to a hand wheel shown in a vertical position in the operator's cab. Due to the fact that this car will at times have to be operated over a 4¼ per cent. grade, it was necessary to provide two high-power low-speed motors to operate it. Two Westinghouse commutating pole mine type motors of 43 hp. and running at 300 r.p.m. were installed. To increase the tractive effort further 26-in. wheels were used on the two sets of standard M.C.B. trucks. Collector shoes attached to the car gather power from two 20-lb. T-rail conductors, running the entire length of the trestle on the ore track or transfer car side. The car is of steel construction throughout.

One electrically operated scale car of the McKee standard design, and having a hopper capacity of approximately 80 cu. ft. was provided. This car is mounted on two pairs of axles and is provided with one Westinghouse series-wound 220-volt 25-hp. direct current crane-type motor, including control equipment consisting of one drum controller with diverters. The hopper of car is supported by a series of pivotally mounted beams connected to a Miller type beam-box containing scale beams of 2000 lb. capacity to enable separate weighing of the various materials entering into the furnace burden. This car was provided with hand-operated counterweighted bottom discharge door and also with foot-operated band brakes. Power is collected for this car by means of two short trolley poles making connection with trolley wires hung in a box running underneath the bins. The car is of steel construction throughout.

One 15-ton steam-operated locomotive crane of special design of the Brown Hoisting Machinery Company was furnished. This crane was provided with a 24 cu. ft. standard Brown grab bucket.

The furnace was equipped with one double-track structural steel skip bridge of the through type construction, rigidly supported at its base and having a pin connecting support at the furnace platform. This bridge has an overall dimension of 160 ft. and a width of 13 ft. center to center of outside girders. The skip pit at the lower end is of concrete, having a front sloping side which is of the same inclination angle as the skip bridge and which forms a support for ties carrying rails continuous with those on the skil bridge. This pit is of sufficient depth below the skip cars to be filled

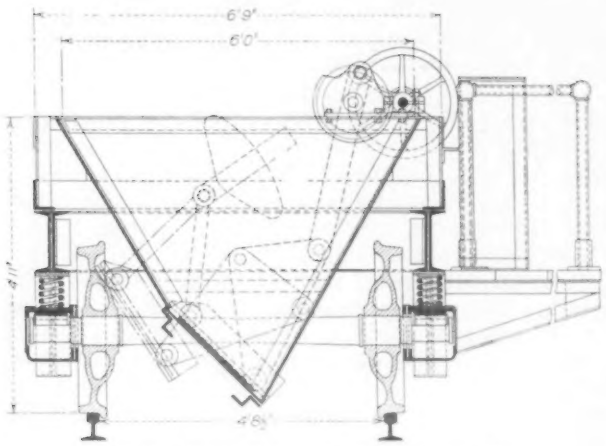


Details of the Baker Suspension Bin

either from the coke bins on each side of pit or from scale car track hoppers located over the pit.

The stock is delivered from the skip bridge to a McKee distributor which is actuated by a 10-hp. series-wound Westinghouse motor and automatically controlled by top and bottom limit switches and electric controller of the six-station six-skips per station type. As auxiliary parts there were furnished a new top plate ring riveted to the old top ring, a new gas seal; bell beams operated by 10-in. and 14-in. steam cylinders for the small and large bells, respectively; structural steel gallows frame, top platform, etc. A hand-operated jib crane was furnished for handling the above parts to the furnace platform. The old hopper and large bell were re-installed. Self dumping 110 cu. ft. skip cars are used, controlled by a 14 x 14-in. double-drum steam-operated Otis hoisting engine in a brick and steel engine house underneath the skip bridge.

An electric power plant for furnishing light and power requirements was installed in a lean-to to the existing blowing engine house. The equipment in-



McKee Scale Car of 80 cu. ft. Capacity

cludes a Westinghouse turbo-generator unit combining a 110-hp. horizontal non-condensing turbine direct connected to a 75-kw. 250-volt Westinghouse generator.

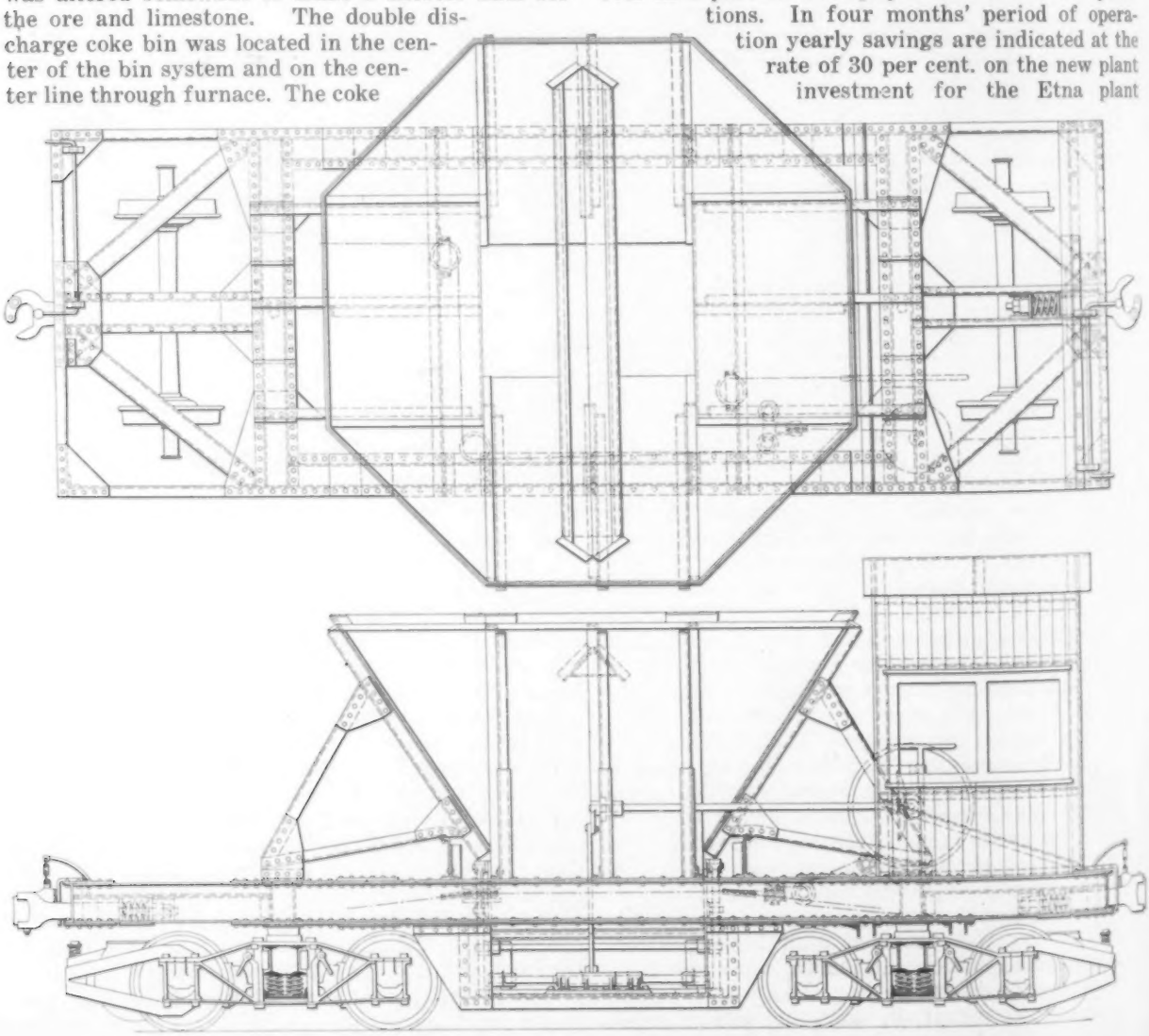
THE IRONTON IRON COMPANY PLANT

The improvements at the Ironton Iron Company plant of the Marting Iron & Steel Company were more limited in scope than at the Etna plant, but in making plans for this equipment, provision was made for possible later installations. At this time only trestles, bins, locomotive crane and transfer car were installed.

The plant was equipped with a bin system practically the duplicate in capacity of the Etna furnace installation. The arrangement of the bins was altered somewhat to make a shorter haul for the ore and limestone. The double discharge coke bin was located in the center of the bin system and on the center line through furnace. The coke bin was built for discharge into skip cars to be installed later, but was arranged with false bottoms and temporary quadrant gates to enable temporary filling into hand-operated coke buggies. The trestle construction, including both single and double tracks, totals 620 lin. ft. The hight of trestle measured to the top of the rail is approximately 12 ft. at the abutment and 23 ft. 6 in. at the first bent of the ore bin adjacent to the abutment, and the grade of tracks between the points mentioned is approximately 3.3 per cent. Beginning at the end bent of the ore and stone bins furthest from the abutment, the hight of the trestle tracks to the top of the rail is approximately 26 ft. 5 in., and at the extreme end of the trestle approximately 30 ft., providing a grade of trestle approximately 1½ per cent.

Eleven ore and stone bins of the Baker suspension type were provided in connection with the Ironton installation. One electrically operated McKee transfer car and a 15-ton Brown crane and grab bucket, a duplicate of the crane for the Etna plant, were provided. Interference with furnace operations was at no time serious nor was it necessary to make any shut-down for changing over from the old charging methods to the new system.

The design and construction of the improvements for the two plants was done on a contract or lump sum basis. The two locomotive cranes were delivered before field operations were started. They were employed on excavations, placing of concrete, erection of steel work and machinery, etc., and when construction was completed, they were turned over as a part of the equipment for furnace operations. In four months' period of operation yearly savings are indicated at the rate of 30 per cent. on the new plant investment for the Etna plant



Plan and Elevation of a 60,000-lb. Electrically Operated Transfer Car

where the advantages of the complete automatic apparatus prevail. The general contract was awarded to Arthur G. McKee, engineer, Cleveland, Ohio. The subcontractor on the steel work for the Etna plant was the Variety Iron & Steel Works Company, Cleveland, and for the Ironton plant, the Riverside Bridge Company, Martins Ferry, Ohio. The officers of the Marting Iron & Steel Company are H. A. Marting, president and general manager, and E. O. Marting, vice-president and treasurer.

ELECTRIC FURNACE REGULATOR

Device for Controlling and Recording Heat Treating Furnace Temperatures

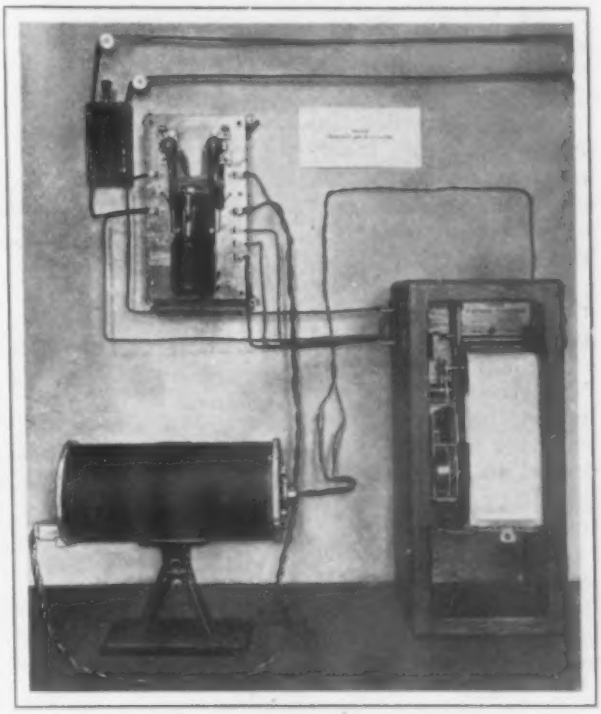
A special type of automatic temperature recorder and regulator for electric furnaces has been placed on the market by the Thwing Instrument Company, 445 North Fifth street, Philadelphia, Pa. It is designed particularly for use in connection with electric furnaces for the heat treatment of small tools, springs, etc., but can also be used in connection with the oil burning and gas fired furnaces.

The galvanometer needle used in the control apparatus is insulated for about one-third of the distance from the pivot, to prevent the control current from entering the galvanometer proper and burning out of the coil or damaging the temperature measuring mechanism. The amount of current carried over the needle is only 0.1 ampere, and a relay is used between the instrument and the switch controlling the current used for operating the furnace.

A movable contact arm consisting of a piece of fiber, sliding on the primary and secondary depressors can be set at the temperature at which it is desired to hold the furnace, the chart being used as a guide. There is a piece of contact metal on the lower surface of the arm which also has a stop at the extreme edge, to prevent the needle from swinging over this piece of contact metal. When the temperature of the furnace is being raised, the switch, of course, is closed, and the current will be delivered through it to the furnace. The temperature is measured by the thermocouple in the furnace which causes the needle to move over the chart scale until it is finally depressed by the metal contact. A circuit is then completed through the contact plate at the back of the needle, and the auxiliary contact on the clock below opens the switch. As the temperature falls, the needle is depressed, so that it completes a circuit through the contact plate, the other depressor arm and the switch, which will then be closed, and the temperature will again rise, the cycle of events being repeated as often as the variation in the change of the furnace temperature makes necessary.

The capillary film recording device, it is emphasized, permits frequent depressions of the needle, and does not necessitate the breaking of the galvanometer circuit to return the needle to the ink-pad. There is no bottom to the groove containing the film of ink, and the pen passes completely through it, and does not deposit any more ink on the chart than is required to make a fine, distinct dot. If depressed against the chart continuously the pen will rule a fine ink line along the entire length of the chart, without any surplus ink running down the side of the pen. It is pointed out that this arrangement makes the outfit desirable for use in chemical and metallurgical laboratories, to produce recalescence curves, where a great number of records, combined with a high chart speed is desired.

Where it is not necessary to record the temperature the control apparatus may be used either as an indicating pyrometer, or preferably as an auxiliary to an indicating or recording pyrometer. For use in cases of this kind an indicating pyrometer is supplied for use in calibrating the control outfit, which consists of one or more pyrometer movements carrying a piece of contact metal on the needle or pointer. This completes a circuit between a depressor arm above the needle and one or two contacts below three times a minute when the arm is depressed by the action of the motor or clock mounted below the pyrometer movement. Any number of these movements can be mounted side by side in a single case, and the depressor arms actuated by the same clock or motor. The control is set by waiting until the auxiliary pyrometer shows that the furnace has reached the proper temperature, and then adjusting the needle so that it stands at a



An Automatic Device for Regulating and Recording the Temperature of Electric Furnaces

neutral point between the two lower contacts. When the temperature rises above the maximum, the needle is depressed on the low contact which is higher on the temperature scale, thus opening the switch and causing the furnace temperature to fall. It is then depressed on the contact lower in the temperature scale, closing the switch and causing the furnace temperature to rise.

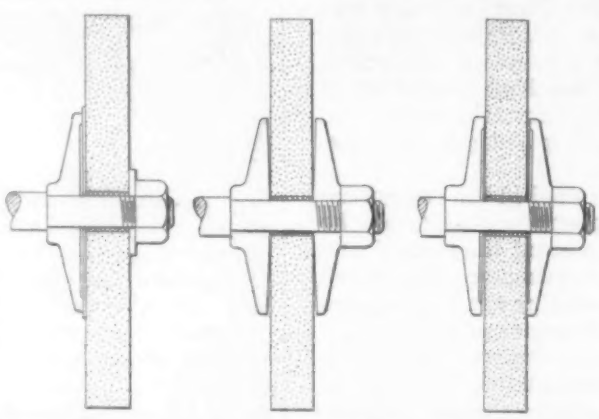
It is emphasized that there need be but 5 or 10 deg. difference in the temperature values of the positions of the two lower contacts, so that very close control can be secured. It is then possible for the workman who has to watch the furnace to devote his time to other work, only occasionally giving attention to the furnace to remove work, etc. The degree of control depends upon the conditions. If it is desired to use the same furnace and small apparatus for working temperatures 100 deg. apart, is it not possible to secure as close control as where conditions can be predetermined, and it is desired to work only at a certain fixed temperature. In this case the instrument can be calibrated for a much narrower range, can be made more sensitive and the control is closer. On a small electric furnace used for tempering watch springs, a range of 1800 deg. F. was covered on the chart, and control was secured to 25 deg. On a similar recorder used for tool work, where the range covered was only 800 deg., it is possible to secure twice as close control.

The Safeguarding of Grinding Machines

Report of a Committee of the National Machine Tool Builders' Association—The Illustrations Obtained from the Norton Company

All wheel manufacturers, to the best of our belief, subject grinding wheels to a speed test. A speed test consists of revolving the wheels at higher speeds than they are recommended to operate. Your committee sees no reason for changing present recommended operating speeds, and suggests that approval be placed on the practice of wheel manufacturers in subjecting wheels to a speed test. The recommended operating speeds should not be exceeded by the user with the possible exception that cylinder wheels, when used in a chuck which incloses at least three-quarters of the wheel, can be operated at speeds recommended for straight wheels.

Control of grinding machine speeds so far as related to speed of grinding spindle.—Where cone pulleys are in use, belt-locking devices or some other device to prevent the belt from slipping to a smaller pulley should be used. If a wheel spindle is driven by a variable speed motor, speed control of the motor should be inclosed in a locked case or some device should be used which prevents motor from being run at too high speeds.



The use of a small washer in place of the outside flange, as at the left, concentrates the pressure near the hole, which, together with the relieved flange of large diameter, creates a very dangerous condition. In the middle are shown unrelieved flanges sprung by excessive tightening of nut. At the right is a diagram illustrating what happens when the hole in the wheel is too small for the spindle

MOUNTING OF WHEELS

Size of flanges.—On floor and bench machines straight flanges should be at least one-half the diameter of the wheels. Safety flanges (sometimes referred to as tapered, bevelled or protection flanges) should be of such size that not more than 4 in. of the wheel projects beyond the area of the flanges.

Designers of cylindrical, universal, internal and wet tool grinding machines have found it advisable to make use of flanges smaller than half the diameter of the wheel. On the types of machines mentioned, a well-designed, substantial protection hood should always be used unless the nature of the operation absolutely prevents its use.

Washers.—Washers of some compressible material, which are slightly larger than the flanges, should be used between the wheel and the flanges. Such washers tend to distribute the pressure uniformly when the flanges are tightened against the wheel. Compressible washers of blotting paper or rubber gaskets are satisfactory.

Relation between size of wheel and size of machine.—Caution must be taken not to use wheels larger or thicker than recommended or provided for by the grinding machine manufacturer. If it is desired to use larger or thicker wheels the matter should be taken up with the machine manufacturer.

Relation between size of hole in the wheel and size of arbor or spindle.—The hole in the wheel and the spindle on which the wheel is used should be of such diameters that the wheel slides on the spindle easily, yet not loose enough to in any way cause the wheel to run out of true. If the hole of the wheel is small it can easily be scraped out, if leaded, or worked out with an old file if not leaded. Such work, however, should only be done by careful workmen, since breakages are known to have resulted from improper reaming of holes.

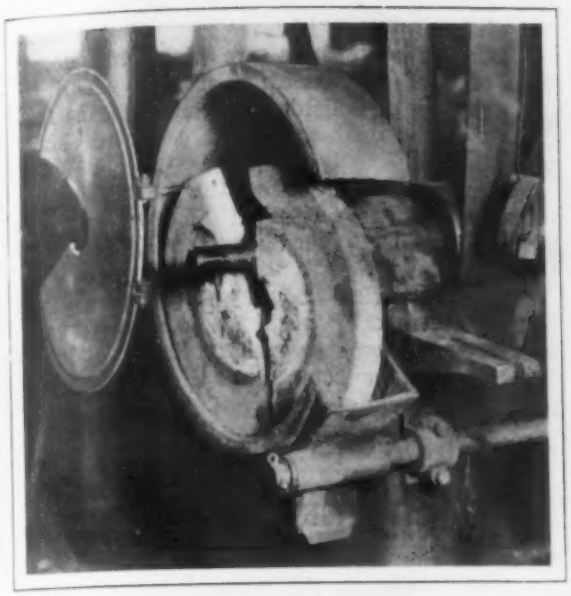
In so far as possible, your committee recommends that, for future designs of floor and bench machines, you adopt uniform sizes for grinding wheel spindles in accordance with the table here given.

Sizes of Grinding Wheel Spindles for Floor and Bench Machines

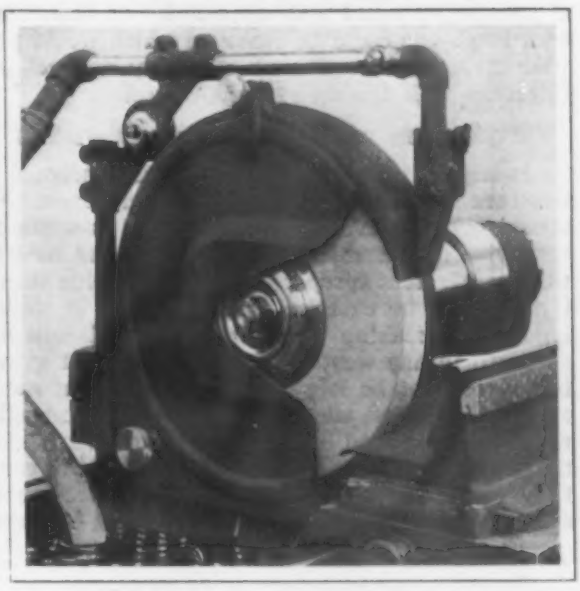
Diam., in.	Thickness of Wheel in Inches																
	¼	⅜	½	⅝	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	4	4½	5
6	½	½	½	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	1	1	1
7	⅝	⅝	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	1	1	1	1	1	1
8	¾	¾	¾	¾	¾	¾	¾	¾	¾	1	1	1	1	1	1	1	1¼	1¼	1¼
9	¾	¾	¾	¾	¾	¾	¾	1	1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼
10	¾	¾	¾	¾	¾	¾	¾	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½
12	¾	¾	¾	¾	¾	1	1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1½	1½	1½
14	⅞	⅞	⅞	⅞	1	1	1¼	1¼	1½	1¼	1¼	1¼	1¼	1½	1½	1½	1½	1½	1½
16	..	..	..	..	1¼	1¼	1¼	1½	1½	1½	1½	1½	1½	1½	1½	1¾	1¾	1¾	1¾
18	..	..	..	..	1¼	1¼	1½	1½	1½	1½	1½	1½	1½	1¾	1¾	1¾	1¾	1¾	1¾
20	..	..	..	..	..	..	1½	1½	1½	1½	1½	1¾	1¾	1¾	1¾	1⅞	1⅞	1⅞	1⅞
24	..	..	..	..	..	..	1½	1½	1¾	1¾	1¾	1¾	1¾	2	2	2	2	2	2
26	..	..	..	..	..	..	..	1½	1½	1¾	1¾	2	2	2	2	2	2¼	2¼	2¼
30	..	..	..	..	..	..	..	..	1¾	2	2	2	2	2¼	2¼	2¼	2½	2½	2½
36	..	..	..	..	..	..	..	..	..	2	2¼	2¼	2½	2½	2½	2¾	2¾	3	3

Relief of flanges.—All flanges, either straight or safety shape, which are used on floor and bench machines, should be relieved. Flanges used on all other types of machines should be relieved wherever possible. The extent of the relief should be such that a flat ring bearing surface (which is approximately one-sixteenth of the diameter of the flanges in width) is left near the periphery of the flanges.

Cup and cylinder wheels.—The types of wheel chucks which inclose at least three-fourths of the wheel have proved satisfactory, so that if a cylinder wheel is used in such a chuck the mounting can be considered satisfactory. When cup wheels are mounted between flanges, both flanges should be of the same diameter and should be of such size that the inside flange has not less than ¼ in. nor more



Efficient Hood, Courtesy of International Harvester Company



Hood on Cylindrical Grinding Machine

than $\frac{3}{8}$ in. clearance between its periphery and the inside surface of the rim of the wheel. All cup wheels mounted between flanges should be covered, as much as operating conditions will allow, with a protection hood. Cup and cylinder wheels which are mounted in a manner similar to those used on the Pratt & Whitney vertical surface machine should be always be protected by a strong hood.

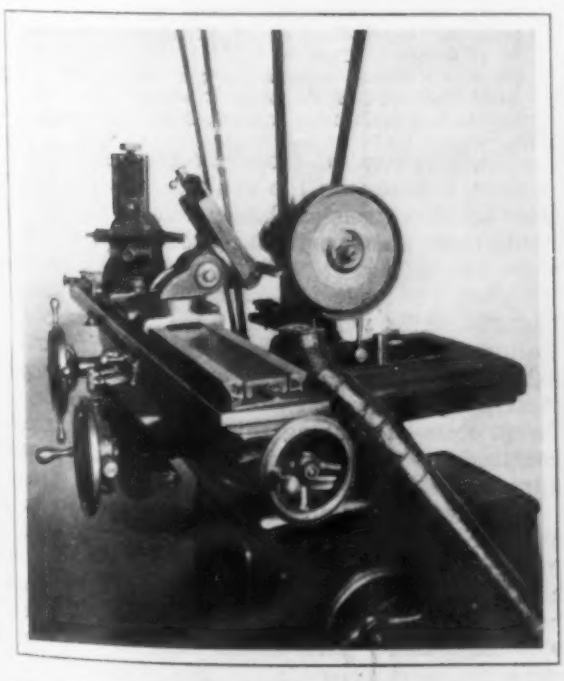
Clamp centers.—Care should be exercised in mounting wheels with clamp centers. If the hole in the wheel and the part of the center which goes into the hole is a tight fit there is great danger of the wheel being broken when the bolts are tightened. If a wheel does not mount easily on clamp centers the manufacturer of the wheel should be notified, and the wheel put to one side until receiving his instructions.

PROTECTING AGAINST BREAKS

Wherever the operation will permit, a well-designed, substantial protection hood should be used. In such situations a tapered wheel and flanges of a corresponding taper are not necessary. Where hoods cannot be used, tapered wheels in connection with flanges of a corresponding taper afford the next best means of providing safety. Care should be taken not to use flanges tapered less than the wheel is tapered. Tapered flanges should be of such diameters that as little as practical of the wheel be allowed to project. In no case should the portion of the wheel extending beyond safety flanges be more than 4 in.

The present type of hoods used on cylindrical machines, plain surface grinders, universal tool and drill grinders, are proving satisfactory, but if larger and thicker wheels should be used some of the types of hoods now in use may prove to be unsatisfactory. If failure of a hood should occur under any conditions whatsoever, this committee will be very grateful for complete details regarding the case in question.

The statement is sometimes made that it has been found impracticable to use hoods or guards for a number of common grinding operations. It is the consensus of opinion of your committee that



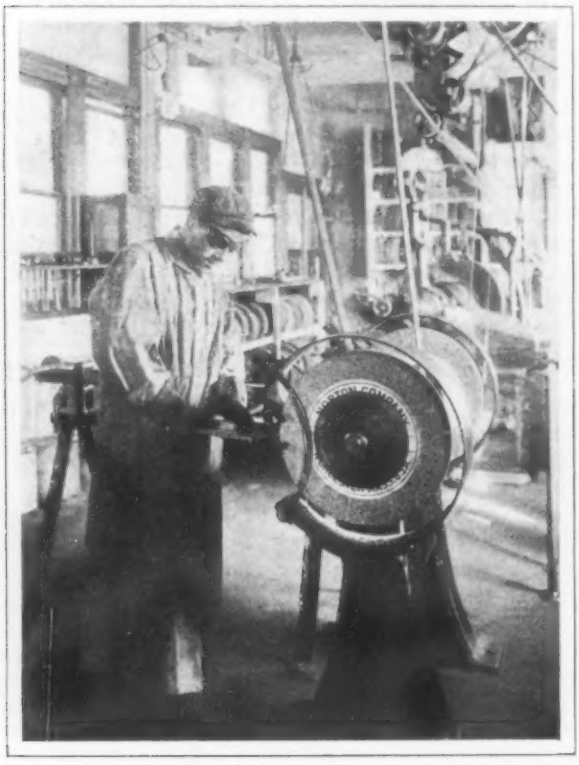
Cast steel hood adapted to tool and cutter grinding machine; opening may be at top, side or bottom of wheel

Showing how wheel should be protected by hood when snagging heavy castings with the aid of chain hoist

if a little time and care were spent on the design of a hood, one could be installed which would provide the necessary amount of safety and yet not interfere with the operation in question.

SUGGESTIONS FOR CARE AND USE OF WHEELS

It is good practice to have one man assigned to the care of grinding wheels and machines. He should examine every wheel before it is mounted, supervise the mounting of the wheel and be held responsible that proper speeds are being used. Care should be exercise in the storing of grinding wheels, making sure that the wheels are not damaged in any way. Wheels used for wet grinding should not be left partly submerged in water over night, or else when started in the morning the wheel will be found to be badly out of balance. If the grinding wheel vibrates badly it should be carefully trued. If vibration is found to be present after a wheel is trued, the wheel should be tested



Protection Hood, Leather Spark Brush, Gloves, Goggles and Proper Adjustment of Rest

for balance, and if found to be badly out of balance the fact should be reported to the wheel manufacturer. On floor and bench machines the work rest should be adjusted close to the grinding wheel to prevent small pieces from wedging, and thus causing accident.

GRINDING MACHINES

All belts within reach of the workmen should as far as possible be guarded on the intake side.

The design of machines should be such as to avoid, as far as possible, the use of set screws and dogs. Where it is not possible to eliminate them, countersunk set screws and properly guarded dogs should be used.

All gearing should be fully guarded.

Chances for being pinched. This should be taken care of in the design of the machine.

It is often possible to make use of swinging pans or guards which will come between the operator's hand and the grinding wheel, thus greatly reducing the chances of being cut by the grinding wheel.

PROVISIONS BY LEGISLATION

Existing state laws are stringent enough to take care of any quantity of dust generated by dry grinding or polishing. Positive means for disposing of the dust after it is collected should be provided.

It is recommended that the association use its influence toward a uniformity in laws and that support be given to the Bremner bill now before Congress.

The association should work toward a reduction in the rates of accident insurance by providing adequate guards to machine tools. It is recommended that the compensation laws be so interpreted and administered as to maintain a good understanding between employer and workmen.

MACHINERY EXHIBITORS

Some of the Companies to Participate in the Panama Pacific Exposition

Among about 150 domestic concerns which are to exhibit in the Machinery Palace of the Panama Pacific International Exposition, San Francisco, next year, may be submitted the following list:

U. S. Electrical Tool Company, Cincinnati.
Cincinnati Planer Company, Cincinnati.
Weston Tool & Mfg. Company, Springfield, Ohio.
Chisholm & Moore Mfg. Company, Cleveland.
Cincinnati Iron & Steel Company, Cincinnati.
Preito Machine Company, New York City.
L. E. Lancaster, Kiowa, Kan.
C. O. Porter Machinery Company, Grand Rapids, Mich.
Cincinnati Bickford Tool Company, Oakley, Cincinnati.
Sangamo Electric Company, Springfield, Ill.
General Electric Company, Schenectady, N. Y.
Kempsmith Mfg. Company, Milwaukee.
Slocum, Avram & Slocum, Inc., New York City.
Humphrey Gas Pump Company, Syracuse, N. Y.
Advance Pump & Compressor Company, Battle Creek, Mich.
Grant Mfg. & Machine Company, Bridgeport, Conn.
Builders Iron Foundry, Providence, R. I.
Aurora Tool Works, Aurora, Ind.
Dreis & Krump Mfg. Company, Chicago.
Moran Flexible Steam Joint Company, Louisville, Ky.
Edison Storage Battery Company, Orange, N. J.
Morton Mfg. Company, Muskegon Heights, Mich.
Foos Gas Engine Company, Springfield, Ohio.
Gould & Eberhardt, Newark, N. J.
Williams Tool Company, Erie, Pa.
Brown Portable Elevator Company, Chicago.
Lodge & Shipley Machine Tool Company, Cincinnati.
M. L. Schleuter, Chicago.
Cincinnati Milling Machine Company, Cincinnati.
Acme Machine Tool Company, Cincinnati.
Bessemer Gas Engine Company, Grove City, Pa.

It will be recalled, from references already made in these columns on the subject, that the Department of Machinery Exhibits, Lieut. G. W. Danforth, chief, plans particularly to have every exhibit show educational as well as commercial features. No charge is made for space. The point taken is that the exhibit will interest a maximum number of visitors if it will show what the different articles exhibited are for; how they operate and accomplish their purposes; what their product is, and the different steps of shaping this product; the interior construction or connection of fixed and movable apparatus, etc.

Nearly all the space in Machinery Palace is subscribed for, but the Department says it will be pleased to hear from manufacturers who do not care to go to the expense of arranging an independent display, but would care to join with others who manufacture parts which could be combined to show live working exhibits. Every effort is to be made to avoid crowding the combined exhibits. The

plan is to place the machinery and electric exhibits under the combined arrangement so that they will stand out prominently as individual exhibits, yet under the general supervision of the person in charge of the collection of each group. A number of firms who have representatives in different parts of the country plan to send at different times one of their salesmen from each district so that their exhibit will be in the hands of their own men but under the general supervision of a combined exhibit agent.

LOCAL SURFACE HARDENING

A Process, Using Oxy-Acetylene Gas, Applicable to High Tensile Steels

Experience has shown that in case-hardening difficulties arise unless the material is originally comparatively mild. It is especially suitable for small articles required in quantities when distortion is of little importance, or for large articles where a great proportion of the surface is to be hardened. But high tensile steel has not been treated with much success, it is said. Nor is the process of case-hardening applicable where only a small portion of the surface is to be treated.

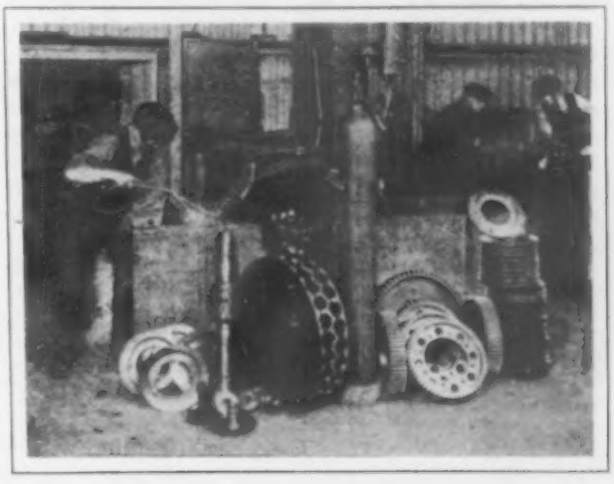
Any method of local hardening by only heating the surface to be hardened has thus great advantages. According to Engineering, London, Messrs. Vickers have perfected, at their River Don works at Sheffield, a system of surface hardening which can be applied to any local part of any casting or forging of high tensile steel without involving distortion and without destroying the effects of the usual heat treatment to which the whole casting or forging may have been subjected. The description follows:

As shown in the illustration, the equipment includes merely the outfit usually supplied for oxy-acetylene welding purposes; four sizes of burners meet all general requirements. The work to be hardened locally is placed in a tank of water with adjustable overflow, so that the water-level can be regulated, as while the portion of the surface being hardened is instantly heated to the required temperature, the whole of the remainder of the article is kept as cool as possible by being immersed in water. Should this be impossible, the part not being hardened must be kept cool by water flowing over the surface. The burner is held so that the outer portions of the flame flow in the direction along which the burner is traveling, and the portion of steel heated should be cooled—when intense hardness is required—by arranging that cooling water shall follow as closely as possible the traveling burner, but not so close as to disturb the flame, because that is not only liable to put it out, but prevents rapid heating and causes irregular hardening. The cost for hardening each square inch of surface is approximately only ¼d. (½c.).

The flame required must be of the highest possible temperature, and burn close to, and even under, water. This is obtained by adjusting the flame as for welding, and then increasing the pressure of oxygen, so that the flame changes color and appearance from a white cone to a bluish-streaked tongue, when observed through smoked glasses.

The essential to success in this method is the speed of heating. In the case of a gear-wheel, for instance, each tooth is not heated up as a whole and then quenched, but the surface is traversed by the flame just as if with a paint brush. The intense heat and the rapidity with which this heat is transferred to the surface of the steel instantly raises the surface to a hardening temperature. As the flame passes along, this surface is instantly cooled by the cold remainder of the forging or casting, leaving this surface of the maximum hardness of which the steel is capable when heated and quenched in cold water. To obtain a thin but intensely hard surface, the part to be hardened should be just below the surface of the water, the impinging flame blowing the film of water away. The normal depth of hardening is about 1/16 in., but a greater depth, up to about ⅛ in. or 3/16 in., can be obtained by slightly prolonging the heating, a small wavy or rotary movement being given to the flame to avoid burning the surface of the steel. The degree of surface hardness can be very easily varied on the same article to suit any requirements, either by drawing the flame very rapidly again across the surface, so drawing the temper, or by arranging that the cooling is less rapid in the hardening. For instance, for sliding gears for automobile work, it is usual to leave the surfaces of the teeth glass hard, but only to toughen the rounded ends of the teeth, which are liable to chip when left hard, as when case-hardened.

In comparing the relative costs of case-hardening and surface-hardening, the cost of subsequent straightening, resetting, and grinding the case-hardened article should be taken into account. Case-hardening is cheaper for small articles requiring a large portion of the surface hard, while for larger articles requiring a small proportion of the surface hard, surface-hardening is very much quicker and cheaper than case-hardening.



Apparatus for Local Surface-Hardening with Oxy-acetylene

For urgent repair work, surface-hardening possesses great advantages, since the machining can be finished outright, the subsequent surface-hardening only requiring from a few minutes to at most half an hour.

Gases in Steel

The gas in blow holes is not, as many foundrymen believe, trapped air, but consists mainly of hydrogen and carbonic oxide with a small quantity of nitrogen, according to Professor Arnold in a lecture on the internal structure of steel before the Sheffield district branch of the British Foundrymen's Association. The question of gas in steel, he said, is the one branch of metallurgy that science has not yet been able to penetrate; that it is possible to get a volume of gas out of sound-looking steel several times as great as the volume of the steel itself and that, as to the effect which this gas has on the properties of the steel, we do not know in what form it exists or what is its action. Professor Arnold added: "In Sheffield at the present moment experiments are being carried out on a large scale to remove this dissolved gas from steel, and I think they present a considerable prospect of success. And when this is done, we are face to face with a new steel which has not been known before to steel metallurgy; a steel which has not only been deoxidized, but very largely degasified, and I will predict we shall find that steel with the same composition in many respects will have very different properties from steel containing dissolved gas. The future will prove whether the prediction I have made will come to pass."

A Carwheel Foundry for the Pacific Coast

Design of Los Angeles Plant Typifying the Practice of the Griffin Wheel Company —Endless Cable for Hauling Ladle Cars

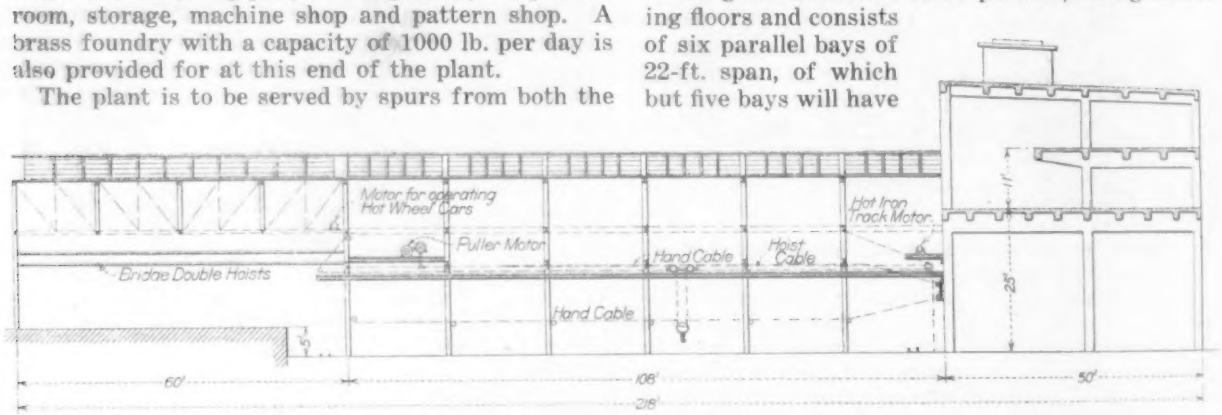
Pioneering in industry is an interesting process. The growth of manufactures at Chicago, the erection of a steel mill at Duluth, the more recent period of expansion in the establishment of metal working plants on the Pacific coast are examples. The carwheel and brass foundry which the Griffin Wheel Company is erecting at Los Angeles, Cal., embodies the arrangement and equipment facilities suggested by the best experience at its other plants. This new plant will have an initial capacity of 250 wheels per day with provisions for an early increase to 300 wheels. The ground layout also provides for extensions which will afford a floor space for the making of 500 wheels daily. In general figures, an immediate expenditure of $350,000 is contemplated for the new construction at Los Angeles. The general ground plan, showing the arrangement of buildings and trackage, which is reproduced is largely self-explanatory. The plant proper will consist of three connected units, the charging building, the foundry proper and the finishing buildings which house the annealing pits, cleaning room, compressor room, storage, machine shop and pattern shop. A brass foundry with a capacity of 1000 lb. per day is also provided for at this end of the plant.

The plant is to be served by spurs from both the Southern Pacific and Santa Fé railroads, which will be laid out to approach the loading and receiving platforms at either end of the plant. For the intraplant distribution of materials a narrow gauge industrial track system is to be installed. Separate storage spaces are to be arranged for pig iron, coke, old carwheels and miscellaneous raw materials. From these several locations the industrial tracks are to be laid to permit concentration of the various materials at the two hydraulic elevators. One of these is to be used for coke and miscellaneous material and the other for metal charges.

The charging building, 62 x 100 ft., is of reinforced concrete construction throughout. In the charging house one 90-in. cupola is to be placed, with provision for the future installation of a second cupola of the same size. The cupola charging floor arrangement will follow the general practice in the other plants of this company and will consist of a main floor, from which the miscellaneous metals will be charged, and an upper deck, to which the elevator carries the coke buggies. From these buggies the coke is charged into the cupola via a short steel chute. The charging floor is to be laid out with sufficient storage track space so that a large number of charges may be concentrated at the cupolas, and in order to carry this load this floor is designed for a safe load of 500 lb. per sq. ft.

Experience in melting carwheel iron has demonstrated the value of a careful distribution of material in the cupola as it is charged. As yet no mechanical means have been devised for accomplishing this and, with the exception of the coke charging, the work continues to be a hand labor proposition. The 90-in. cupolas are generally lined down to a diameter of 72 in. and on this basis a melt of about 17 tons per hr. is secured. On the ground floor the charging building is designed without curtain walls around the cupola except between the cupola room and the coreroom. Particular care has also been taken to limit the number of columns so that the space around the bottom of the cupola is open and unobstructed.

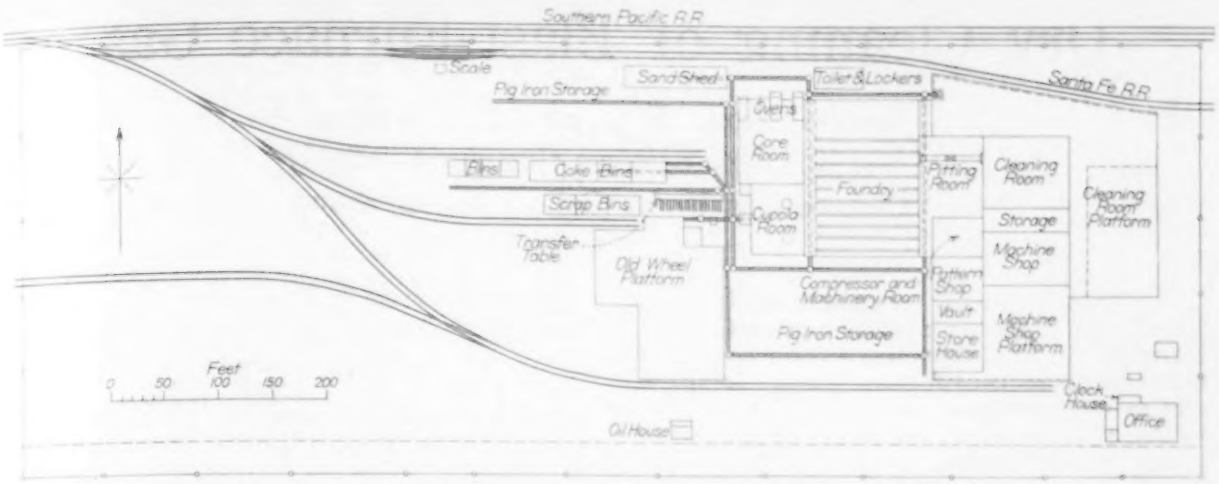
The foundry is 108 x 143 ft. in ground plan, of steel frame construction, with corrugated steel siding and fireproof covered roof of sawtooth design. The arrangement of the foundry building conforms to the general scheme of 10 parallel, straight molding floors and consists of six parallel bays of 22-ft. span, of which but five bays will have operating floors at the time the plant is first placed in service. The molding floors are spaced 11 ft. on centers. The hight of the building has been restricted to a minimum overhead clearance and the sawtooth roof is arranged with the roof sections corresponding in number and direction to the wheel floors. The lighting panels will receive a north light and are equipped with continuous sash for ventilating purposes.



Section Through the Foundry Proper, Showing the Installation of the Hoists and the Controlling Cables

For the handling of hot iron and hot wheels after being shaken out from the molds, two narrow gauge parallel tracks are laid across the foundry, one at each end of the molding floors and running at right angles to them. On the track at the cupola end there is to be operated a ladle car with an endless cable haul, the power for which is furnished by an electric motor drive with a controller at the cupola. The tap from the cupola is poured into a bull ladle and from this is transferred to the smaller ladles mounted on the ladle transfer car. This smaller ladle has a capacity of about 1100 lb. (the average wheel weighs about 700 lb.) and is arranged with a spout for bottom pouring.

Directly above the wheel floors and extending over the transfer tracks at each end of the foundry are I-beam trolleys suspended from the roof



Plan of the New Griffin Foundry, Showing the Arrangement of the Various Departments

girders. There will be mounted on these trolleys, either hydraulic or pneumatic traveling hoists with cable controls, so that the action of the hoist may be directed from any point along the floors. A general sketch of this hoist installation, together with the controlling cables and motor drive, is presented. These hoists will be of 1-ton capacity.

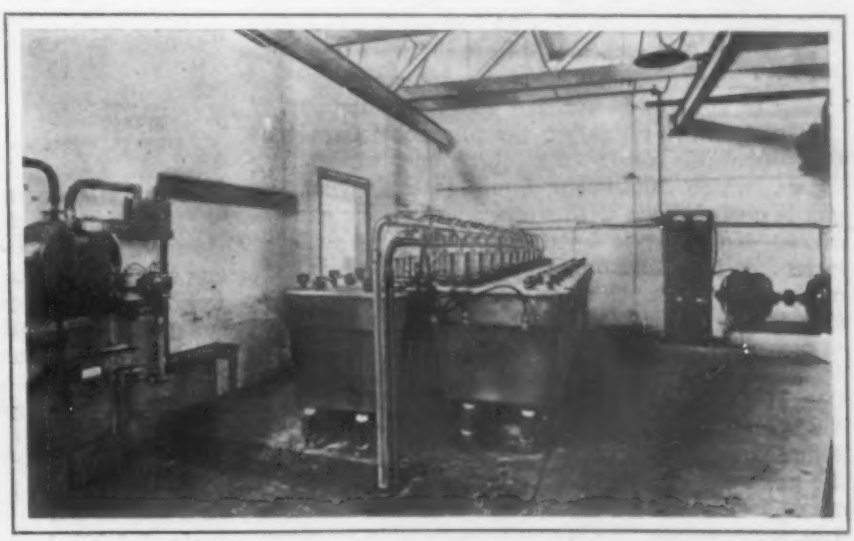
The small pouring ladle is picked up from the ladle car on the track at the end of the foundry by these hoists and carried to whatever molds are ready for pouring. One molder and a helper put up, pour and shake out 25 wheel molds a day. The same hoist serves for lifting the hot wheel out of the mold and carrying it to the transfer track at the pitting room end of the foundry. Here the wheel is loaded on a transfer truck from which it is picked up by the pitting room crane. This pitting room crane is to be of the four-motor electric overhead type with two independent hoists and a 60-ft. span. The arrangement of the annealing pits conforms to the customary practice of cylindrical steel shells lined with fire brick, the intervening spaces between the pits being filled with sand.

From the annealing pits the wheels will be taken to the sand blasting hood. This sand blasting device, which provides for the wheel running on continuously moving roller treads and revolving continuously between sand blast nozzles, will not be materially different from the usual cleaning arrangement. Provision is made in the immediate adjoining floor space for the subsequent cleaning, testing and inspection operations before the wheel is rolled out on the storage or loading platform. At this end of the plant, space is also inclosed for a compressor room in which will be installed not only the compressor for the sand blast, but also the blower for the cupola, the blower pipe being carried through the foundry. A machine shop also adjoins and is to be equipped with a mill for boring the wheels, a lathe for turning axles and a hydraulic press for mounting wheels on axles.

The Acklin Stamping Company, Toledo, Ohio, manufacturer of metal stampings for automobile parts, has opened a Detroit office at 927 Ford Building, in charge of W. C. Acklin, secretary of the company.

Electrolytic Oxygen Plant in Australia

The International Oxygen Company, Newark, N. J., has recently shipped one of its plants for the electrolytic production of oxygen and hydrogen to the Australian Oxygen Company. In this system, which was illustrated in *The Iron Age*, August 17, 1911, an iron tank is utilized as the negative pole and contains the perforated tank, which is the positive one. An asbestos sack between the two tanks divides the generator into two parts, the gases being given off in separate compartments, the oxygen on the wall of the inner tank and the hydrogen on the inner wall of the outer one. This asbestos sack is also relied upon to afford an additional check against possible mixing, as when it is impregnated with a solution of caustic soda that has been added to render the water more easily decomposed, it forms a barrier between the two gases. The gases are not led directly to the reservoir, but pass through water placed in the glass lanterns on the top of the generators. The water used in the generator can be supplied from any available source, the only precaution being that it must not be exceptionally acid or alkaline.



A Plant for the Electrolytic Production of Oxygen and Hydrogen Recently Installed in Australia

The current used is supplied by the motor-generator set shown in the background at the right, and about 400 amperes at 2.2 volts per cell is required to produce 3.8 cu. ft. of oxygen per kw. hr. and double that quantity of hydrogen. The hydrogen is marketed by the Australian Oxygen Company, for use in the cutting of heavy steel and iron.

Dry Cleaning of Blast-Furnace Gas*

Results from European Installations—Wet and Dry Systems Compared—Highly Cleaned Gas Under Boilers and in Stoves

BY FRITZ MÜLLER

At the International Congress of Mining, Metallurgy, Applied Mechanics and Practical Geology in Düsseldorf in 1910, there was a paper dealing with the cleaning of blast-furnace gases. In the discussion which followed this report, I drew the attention of the metallurgical world for the first time to the results obtained by the practical application of a new process of dry gas cleaning, which was first carried out in a large experimental plant dealing with 175,000 cu. ft. of gas an hour, this plant being situated at the Halbergerhütte at Brebach, near Saarbrücken, Prussia.

Since then a great number of industrial installations, including many of large capacity, have been erected and put into operation, and others are in course of erection. The first large plants were started in 1911, and are still at work, giving the greatest satisfaction to their owners. The results obtained with these are of sufficient interest for communication to the metallurgical engineering world.

[The author here gives a description of the Beth system of dry cleaning. In *The Iron Age* for April 9, 1914, this was fully described and illustrated, with the results of some tests, at the Halbergerhütte, as contained in Stahl und Eisen and contributed by E. Mayer.]

PRACTICAL RESULTS OF DRY PROCESSES

What will chiefly interest the practical man are the results obtained by the new process. In the first place, the gas is of a higher purity than has ever before been obtained by any other cleaning system; secondly, the working costs are very low owing to the low power and water consumption.

The gas after passing the filter chambers generally contains about 3.5 milligrammes of dust per cu. m., which falls below 1 milligramme when the gas is cooled down with water to serve for gas engines. No water is injected into the fan, and the latter has therefore only to overcome the resistance of the filter bags. Consequently its power consumption is far lower than that of corresponding fans in wet cleaning processes.

Tests carried out by Prof. F. Mayer, of Aix-la-Chapelle, on the plant of the Halbergerhütte show that for the actual cleaning process the power consumption is 1.91 hp. per 1000 cu. m. of cleaned gas, the gas being taken at 0 deg. C. and 3.0 in. of mercury. For an increase in pressure corresponding to 4 in. water-gauge, the power consumption increases by 0.81 hp. per 1000 cu. m. of gas. Very striking was the difference of power consumption of a large new plant in the Minette district in comparison with that of a wet-cleaning plant which it replaced. The wet-cleaning plant for gas engines required 350 hp., which dropped when starting the dry-cleaning plant to 70 hp. The quantity and pressure of gas was the same in both cases, while the dust content of the gas fell to 2.5 to 1 mg. per cubic meter of gas.

Some data concerning older cleaning plants which I received from an important German metallurgical firm may be mentioned in order to show the advances made in the cleaning of blast-furnace gases by the application of the dry method:

Kind of cleaning	Water consumption, liters per cubic meter	Power consumption, hp. per 1000 cubic meters	Cleanliness, grammes of dust per cubic meter
(*a*) Preliminary cleaning with hurdle washers.	3.0	....	0.50 to 0.80
(*b*) Secondary cleaning in the fan	1.5	2.5 to 3.0	0.10 to 0.30
(*c*) Secondary cleaning in the Theisen washer..	2.0	7.0 to 7.5	0.013 to 0.02

It should be noted that the figures under *a* are for so-called preliminary cleaned gas containing 0.5 to 0.8 g. of dust per cu. m., which was then treated by the processes under *b* and *c*. The figures given there have to be added to be compared with the figures for dry cleaning.

As to American conditions, I am able to give the average results of several years' working at the cleaning plant of the Illinois Steel Company. There the gas is first treated in hurdle cleaners with large quantities of water, namely, 11 to 12 liters per cu. m. of gas. The secondary cleaning is done in Theisen apparatus, which require 2.5 l. of water per cu. m. of gas and 8.2 hp. per 1000 cu. m. of gas, the degree of cleanliness obtained being about 0.014 g. The working costs in this case are about 2.75d per 1000 cu. m. of gas, redemption and interest not being taken into consideration, and the horsepower hour being calculated at 0.28 cents.

Results obtained with the new wet processes—for instance, the so-called Bayer system with disintegrator—are given below, though these have not yet been verified, so far as I know:

Wet cleaning, Bayer system	Power consumption, h.p. per 1000 cubic meters	Water consumption, liters per cubic meter	Cleanliness, grammes of dust per cubic meter
Preliminary cleaning..	2.7 to 3.2	0.5 to 2.0	0.2 to 0.4
Final cleaning.....	3.5 to 4.0	3.0	0.01 to 0.02

As will be seen, these results fall far short of those obtained with the dry cleaning process, and personal information I recently obtained concerning a Bayer apparatus supplied to Westphalian Iron & Steel Works shows that guaranteed results were not nearly attained. The same was experienced in the case of a plant of the same kind supplied to a Russian works.

The new design of disintegrator built by Mr. Theisen, of Munich, shows, according to communications in Stahl und Eisen, a power consumption of 5.0 to 5.5 hp. per 1000 cu. m. of gas, a consumption of water of 0.4 to 0.7 l. per cu. m., and a dust content of 0.008 to 0.02 g. per cu. m. Though the amount of water used in this new apparatus is smaller than before, there is still the disadvantage that the cleaning water has to settle and the mud afterwards has to be removed. The consumption of water given for the Theisen apparatus is only the water necessary for washing the gas, and it is therefore necessary to cool the gas down considerably, which means a further consumption of water.

THE DRY AND WET PROCESSES COMPARED

Naturally a dry-cleaning plant cannot be cheaper, as to first cost, than a wet-cleaning plant; the first cost is somewhere about £175 per 1000 cu. m. of gas, but trials are in progress which will

*From a paper presented at the London meeting of the Iron and Steel Institute, May 7 and 8.

result in a considerable reduction of the first cost by increasing the capacity and simplifying the mechanism of the plant. On the other hand, the dry-cleaning plant has the advantage of low working costs, which are about 1d. to 1¼d. per 1000 cu. m. of cleaned gas, without redemption and interest, the power being taken at 0.375d. per kw.-hr. This is without taking account of the advantages obtained by using highly cleaned gas.

Another point in favor of the dry-cleaning plant is the very small ground space required, since it extends more in the direction of hight; generally not more than 4 to 5 sq. m. (40 to 50 sq. ft.) per 1000 cu. m. of gas are required, whereas wet cleaning plants require two or three times as much space, including the settling tanks. The dry process plant can be easily adapted to any local conditions. In the case of a plant at an ironworks on the Saar, the apparatus is erected above the casting bed of the blast furnaces, no other place being available.

The recovered dust is removed in a dry state, whereas in wet-cleaning plants it carries about 80 per cent. of water, which greatly increases the difficulties of handling the mud. Moreover, the wet mud cannot be utilized, whereas the dry dust, on account of its extraordinary fineness and its content of lime, can be used for many purposes, such as the manufacture of cement, the briquetting of ores, and as insulating material, etc.

USE OF THE DUST IN CEMENT AND BRIQUETTING

The cement specialist, F. Mayer, found by systematic trials that by adding 30 per cent. of gas filter dust to Portland cement the strength was increased, especially its resistance to pressure. Samples stored for 28 days in air, in air and water, and under water showed respectively a compressive strength of 566 kg., 398 kg., and 455 kg. per sq. cm. The dust is of such fineness that it requires no further crushing; on the 5000-mesh sieve it leaves no residue. The cubic meter of dust weighs somewhat more than 200 kg., whereas the specific gravity amounts to 2.37. At an ironworks on the Saar the dust is used as a binder in briquetting the heavier furnace dust. At a French works, where the furnaces are making special irons, the same thing is being done. Formerly, at the last mentioned works, purple ore was briquetted with lime; the lime is now replaced by filter dust, and the briquettes are of greater strength than formerly. In many places the filter dust contains a certain amount of alkalies, so that it can be used as a fertilizer. The saving obtained through the sale of dust represents in many works about 20 per cent. of the working cost of the plant.

ADVANTAGES OF HIGHLY CLEANED GAS

The advantages of highly cleaned gas are well known to all specialists. They are most apparent in gas engines, since by employing a gas of great purity a far greater degree of safety in working is assured. Stoppages are reduced to a minimum, thus reducing the cost for cleaning, repairs to cylinders, pistons, and stuffing boxes. A comparison, made on a gas-engine plant of some 5000 hp., shows that since the introduction of the dry-cleaning process only about a fourth of the former stoppages are necessary, whereas the cost for repairs and cleaning are about a fifth to a sixth as against working with wet-cleaning gas; calculated on the horsepower the gain was of about 2s. 7d. per yr. Further advantages are that misfires and early ignitions are practically done away with, and cheaper lubricating oils can be used.

In a large steel works on the Rhine, where the crude gas pressure is extraordinarily high (up to 24 in. water-gauge), it is possible to convey the gas to the gas engines without the aid of any fan and without final cooling. The gas reaches the engines with a temperature of about 40 deg. C. The engines being of ample design, work quite satisfactorily, the combustion air being in this case reduced somewhat. For cleaning the bags a small fan is specially installed. In this case, which cannot serve as a typical one, the total consumption of power per 1000 cu. m. of gas is about a fourth of a horsepower.

Opinions are divided as to the advantages of the highly cleaned gas with boilers. Generally it is taken that primary cleaned gas with about 0.5 g. per cu. m. is perfectly sufficient. It is implicitly admitted, however, that this primary cleaned gas gives better results than the crude gas, and therefore there is no doubt that the results will be still further improved by burning highly cleaned gas, which it is possible to obtain at a lower cost than the less perfectly cleaned gas.

Hoff gives in Stahl und Eisen interesting results on evaporation trials made in Dudelange, which show that with crude gas the evaporation drops within four weeks after cleaning the boilers from 65.5 to 47.7 per cent. This may show how advantageous it is to prevent these deposits of dust in the boiler uptakes. Evaporation trials made with crude gas in Cornish boilers at the Halbergerhütte showed an evaporation of 12 to 15 kg. per sq. m., a useful effect of 50 per cent. Comparative trials with highly cleaned gas showed after the boilers had been working four weeks an evaporation of more than 23 kg. per sq. m., with a useful effect of 73.2 per cent. The blowing out of the boiler tubes and the frequent cleaning of the flues and mains being unnecessary, a considerable saving will result.

CLEANED GAS IN COWPER STOVES

The conditions as regards heating the Cowper stoves are similar to those of boilers. The highly cleaned gas mixes far more intimately with the combustion air, and therefore a more intensive combustion is obtained. If the brickwork remains free from dust deposit a far better heat transmission can certainly be obtained. The following example from actual blast-furnace practice may be cited: At the Halbergerhütte a blast furnace of a capacity of 100 tons of foundry pig iron daily was heated by four Cowper stoves 28 m. in hight by 6.5 m. in diameter. The brickwork was of the Böcker system, on account of the dust content of the crude gas which was formerly burnt. When working with crude gas, blast temperatures between 900 to 950 deg. C. measured in the furnace were obtained. At certain intervals the stoves of course had to be freed from slag and dust, and from time to time the upper layers of brickwork required to be renewed. When one stove was out of work for repairs or cleaning the consumption of coke naturally rose. After cleaning and repairing, the stoves were heated with highly cleaned gas, and it was immediately found that three stoves were perfectly sufficient to heat the blast, the quantity of gas burnt per stove remaining the same, or in other words there was saving in gas of 33 per cent. The stove is under blast for about four hours, during which time the temperature drops from 930 to 950 deg. C. at the beginning to about 840 to 850 deg. C. at the end. After one year's working, the chequer work was examined and was found in good condition.

Any blast-furnace man can easily calculate the saving in cleaning, repairs, as well as the saving of coke, which otherwise would have been necessary

during the different stoppages. At another works in the Saar district where the blast furnaces are also driven with cleaned gas, it was found after actual measurements over a long period that there was an actual saving of 15 per cent. of gas as against the former working with uncleaned gas.

At the French works already mentioned it was found that in the manufacture of special qualities of iron, the difficulties and variations in quality ceased as soon as the dry cleaning plant was started, thus proving that the temperatures of the blast were more equalized. Unfortunately, it was not possible to obtain more exact particulars.

Nowadays, on account of the rising price of fuel, the center of gravity of any ironworks lies in the blast-furnace work, this being the principal power source of the works. All works are striving to use as little as possible, or even no other fuel whatever besides that used for the production of coke. This means economical working and utilization of the blast-furnace gases, and this object is best attained by using highly cleaned gas.

By a more suitable construction of the Cowper stoves, and by the use of more scientifically constructed gas burners, still more important advantages can without doubt be obtained. A trial made in this respect at the Halbergerhütte on a Cowper stove shows that it is possible when using the highly cleaned gas to do away with the chimney stack. A firebrick arch was erected in the chimney above the hot-blast outlet and the chimney was filled up with chequer work constructed in the ordinary way. The highly cleaned gas on being introduced with a certain pressure draws its own combustion air through a specially constructed burner, where both air and gas are very intimately mixed. The mixture of air and gas strikes a specially provided brick surface opposite the burner, and the combustion is so intense that at about 1½ to 2 m. higher than the gas entrance the temperature is about 1200 deg. C. The result of this trial was that the temperature of the burnt waste gases was very much reduced. As the trials are not yet finished, I am not yet in a position to present final conclusions as to the saving in gas which can be obtained in this way, and these must be reserved for another occasion.

Since the introduction of this new cleaning process three years ago, the interest shown by blast-furnace men has constantly increased. Several plants of a capacity of 240,000 to 300,000 cu. m. are now in course of construction in the Saar and Westphalian districts, and there are 23 plants in Europe in actual operation with a capacity of 1,886,000 cu. m. per hr. and 21 in the course of construction or ordered having a prospective capacity of 1,757,000 cu. m. per hr.

German exports of iron and steel for the first quarter of this year aggregated 1,627,406 tons, an increase over the same period in 1913 of 22,811 tons. The imports to April 1 totaled 119,486 tons, a decrease from last year of 32,034 tons. In machinery the exports to April 1 amounted to 131,555 tons, the imports totaling 22,540 tons. This contrasts with 129,624 tons and 15,947 tons respectively for the first quarter of 1913, a gain in each case.

The Magee Furnace Company, Chelsea, Mass., has been petitioned into bankruptcy by creditors. Joseph O. Proctor, Jr., Ralph S. Wentworth and J. A. Lowell Blake have been appointed receivers. The liabilities are estimated at $375,000. The company manufactures house-heating boilers and furnaces, stoves and ranges, and for many years has been one of the most prominent manufacturers in its several lines.

GREATER LICENSE FOR LABOR

Clayton Anti-Trust Bill Would Give Union Labor Special Privileges

WASHINGTON, D. C., May 12, 1914.—The so-called Clayton omnibus anti-trust bill, which has just been reported from the House Judiciary Committee, embodies not only a comprehensive series of provisions supplementing the Sherman anti-trust law but a far-reaching "bill of rights for labor," to quote Chairman Clayton's reference thereto in his accompanying elaborate report on the bill. It is safe to say that no feature of the proposed measure will attract more attention among manufacturers and other employers than this so-called bill of rights, which embraces a qualified exemption to the operations of the anti-trust laws in favor of labor organizations, etc., a new and comprehensive series of provisions regarding the issuance by the courts of injunctions and special provisions for the punishment of contempt of court in disobedience of injunctions or other court orders.

TO LEGALIZE STRIKERS' METHODS

The original provision of the Clayton bill, containing a limited exemption in favor of "fraternal, labor, consumers', agricultural or horticultural organizations, orders or associations operating under the lodge system," was recently described in this correspondence. The Judiciary Committee, in reporting the bill, has eliminated the phrase "operating under the lodge system" so as to broaden the exemption to cover every form of organization, and has added a series of amendments designed to legalize many acts for which injunctions have heretofore been obtained by employers against striking workmen and the officers of their organizations.

The object of section 7 of the bill as reported (section 6 of the original bill) is stated by Chairman Clayton to be to "make clear certain questions about which doubt has arisen as to whether or not fraternal, labor, consumers', agricultural or horticultural organizations, orders, or associations organized for mutual help, not having capital stock or conducted for profit, come within the scope and purview of the Sherman anti-trust law in such way as to warrant the courts under interpretations heretofore given to that law to enter a decree for the dissolution of such organizations, orders, or associations upon a proper showing, as may be done in regard to industrial corporations and combinations which have been found to be guilty of violation of its provisions."

Chairman Clayton declares that the committee feels that all doubt should be removed as to the legality of the existence and operations of these organizations and associations, and that the law should not be construed in such a way as to authorize their dissolution by the courts under the anti-trust laws or to forbid the individual members of such associations from carrying out the legitimate and lawful objects of their associations. This object, he says, will be accomplished by the provisions of the amended section 7, which "recognize as legal the existence and operations" of labor organizations, etc., "and forbid the danger and possibility of the dissolution of such organizations, orders, or associations by a decree of the courts as unlawful combinations in restraint of trade or commerce under the provisions of the anti-trust laws, and also guarantee to individual members of such organizations, orders or associations the right to pursue without molestation or legal restraint the legitimate objects of such association." Section 7, Chairman Clayton asserts, "should be construed in connection with sections 15 to 22, which regulate the issuance of injunctions and provide for jury trials in certain cases of contempts in Federal courts." All the sections taken together constitute "for labor a complete bill of rights in equitable proceedings in the United States courts."

AN ABSTRACT OF THE LEADING PROVISIONS

In view of the significance of the sections of the bill relating to injunctions and the punishment of contempt of court as indicated by Chairman Clayton, a brief résumé of these provisions will be of interest.

Section 15 provides that "no preliminary injunction shall be issued without notice to the opposite party," and not even a temporary restraining order shall be granted without such notice, "unless it shall clearly appear from specific facts shown by affidavit or by the verified bill that immediate and irreparable injury, loss, or damage will result to property or a property right of the applicant before notice could be served or hearing had thereon." It is the almost unanimous opinion of the lawyers who have addressed the Judiciary Committee during the discussion of the various anti-injunction bills in recent years that the right to carry on business is not a property right within the meaning of section 15, hence the enactment of this provision will deprive employers of the right to invoke without notice restraining orders to prevent disturbances calculated to interfere with the peaceful conduct of business. The delay incident to giving notice would in most cases prove fatal to the object of the restraining order. Section 16 requires the giving of bonds by persons applying for restraining orders or injunctions. Section 17 is ingeniously phrased to limit the application of injunctions and restraining orders, requiring that such order "shall describe in reasonable detail, and not by reference to the bill of complaint or other document, the act or acts sought to be restrained, and shall be binding only upon the parties to the suit, their agents, servants, employees, and attorneys, or those in active concert with them, and who shall, by personal service or otherwise, have received actual notice of the same."

The most important provision of the Clayton bill as applying to labor disputes is found in section 18, which limits the use of restraining orders and injunctions, and legalizes many acts of "organized labor" with which the public is familiar. The text of this section, which should be carefully examined by every employer, is as follows:

Section 18. That no restraining order or injunction shall be granted by any court of the United States, or a judge or the judges thereof, in any case between an employer and employees, or between employers and employees, or between employees, or between persons employed and persons seeking employment, involving, or growing out of, a dispute concerning terms or conditions of employment, unless necessary to prevent irreparable injury to property, or to a property right, of the party making the application, for which injury there is no adequate remedy at law, and such property or property right must be described with particularity in the application, which must be in writing and sworn to by the applicant or by his agent or attorney. And no such restraining order or injunction shall prohibit any person or persons from terminating any relation of employment, or from ceasing to perform any work or labor, or from recommending, advising, or persuading others by peaceful means so to do; or from attending at or near a house or place where any person resides or works, or carries on business or happens to be, for the purpose of peacefully obtaining or communicating information, or of peacefully persuading any person to work or to abstain from working; or from ceasing to patronize or to employ any party to such dispute, or from recommending, advising, or persuading others by peaceful means so to do; or from paying or giving to, or withholding from, any person engaged in such dispute, any strike benefits or other moneys or things of value; or from peaceably assembling at any place in a lawful manner, and for lawful purposes; or from doing any act or thing which might lawfully be done in the absence of such dispute by any party thereto.

Disobedience of an injunction or restraining order subjects any person guilty thereof to liability to be proceeded against for contempt of court, according to section 19, but section 20, after providing for ample notice to the accused and for the giving of bail, provides an elaborate trial by jury of such person, such trial to conform "as near as may be to the practice in criminal cases prosecuted by indictment or upon information." This section also limits punishment to a fine of $1000 and imprisonment to a term of six months. By section 21 judgments of conviction for contempt of court are made reviewable upon writ of error "in all respects as now provided by law in criminal cases." The only power left to the courts for punishing contempt without the elaborate jury trials above described relates to offenses committed "in the presence of the court or so near thereto as to obstruct the administration of justice."

LABOR LEADERS WISH EVEN GREATER PRIVILEGES

It would seem from an examination of the provisions of the measure above quoted that the Judiciary Committee had indeed framed a "bill of rights" for labor with which the most radical pro-labor advocate would be satisfied. Nevertheless, several members of the House, presumably acting at the instance of the officials of certain labor organizations who have been most prominent in this movement, have importuned Chairman Clayton to substitute for section 7 the provisions of the so-called Bacon-Bartlett bill which, as construed by the labor leaders, not only exempts labor organizations when engaged in "carrying out the legitimate objects thereof," but even when engaged in acts clearly constituting restraints of trade. A delegation of members of the House have gone so far as to make this plea to President Wilson himself, and a well-organized campaign is now on foot to secure such amendments to the Clayton bill as will clearly place organized labor beyond the reach of the anti-trust laws, no matter what may be the character of the conspiracies that may be set on foot.

It has been pointed out to these advocates of unrestricted license for organized labor that such amendments as are desired would probably result in a nullification of the exemption by the courts on the ground of unconstitutionality, as being a clear discrimination in favor of certain classes of citizens as against others. This suggestion appears to have little weight with the advocates of the amendments referred to, who express a willingness to "take chances" of adverse action by the courts. They seem to be satisfied to receive credit for securing the desired legislation, leaving it to organized labor to criticize the courts in the event that the exemption is invalidated. W. L. C.

Germany Leads in Commercial Organizations

Germany's commercial organizations are described in a bulletin just issued by the Bureau of Foreign and Domestic Commerce at Washington. There is also a brief analysis of German cartels or combinations to control output and prices, together with data on German agricultural organizations. Two classes of trade associations are described—the official chambers of commerce and the independent or free associations. The chambers of commerce are regulated by the various German states and differ considerably in function. Practically the whole country is divided into chamber of commerce districts and the chambers number more than 150. There are about 600 independent associations in Germany and the entire industrial system of the country is honeycombed with hundreds more of subsidiary organizations. Commissioner Archibald J. Wolfe, of Washington, spent considerable time in Germany gathering the data for this volume. He was struck by the comparatively small income of the German organizations, the low salaries paid and the subdivision of work among branch organizations. The Steel Works Union, for example, has a secretarial force of only three men, but it is one of the most important organizations of its class in the empire. The small force at headquarters is explained by the wonderful subdivision of work among a mass of local organizations. The bulletin discusses state aid to commerce and shows what the German Government is doing to promote especially the foreign trade of the country.

Pig iron is to be admitted into Russia at reduced rates of duty from March, 1914, to January 13, 1916, according to a decision by the Council of Ministers, the total amount not to exceed 323,000 tons. Special application must be made and the amount of reduction will be decided in each instance.

The Cincinnati Planer Company, Oakley station, Cincinnati, Ohio, has just completed two extraordinarily large planers for shipment to a European customer. These planers are 96 in. x 96 in., 20 ft., and will weigh approximately 100 tons each.

ESTABLISHED 1855

THE IRON AGE

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Gompers Wins

It is perhaps fortunate that the decision of the United States Supreme Court in the proceedings against Gompers and his associates related to labor leaders and not capitalists. One can well imagine the furore of indignation that would sweep over the country if a charge against capitalists of contempt of court had been dismissed for such a reason as the application of the statute of limitations. Here is a case in which, according to the history of the proceedings, no time whatever has been lost by the counsel of the opposing parties to press for a decision. The case has been tried, appealed, tried and appealed again, and at no stage had a lapse occurred as far as a layman's observations can determine. The United States Supreme Court, however, decides that "the power to punish for contempt must have some limit in time," and states that "by analogy, if not by enactment, the limit is three years."

Mild indignation may be felt by manufacturers that in this case there should have been such a failure to impose punishment for what has generally been considered an aggravated case of refusal to submit to the judgment of a court. They have found by long experience, culminating in recent years, that the power of organized labor has steadily grown, until not only lawmakers, executives and even public opinion have been influenced on the side of trade unions. The feeling aroused by this decision may, therefore, be expected to subside, and manufacturers will resign themselves to accept it as another indication of the manner in which the unions are dominating the affairs of this country. We venture to say that no manufacturer will endeavor to lead a campaign for the abolition of the United States Supreme Court or for the recall of Supreme Court judges, as would undoubtedly have been the case if the decision had favored a capitalist who was charged with contempt of court and was permitted to escape the penalty of his contumacy on such a plea.

With this decision, it would hardly seem to be necessary for Congress to enact into law the Stanley bill, which has just been reported to the House of Representatives and which carefully defines the "rights of labor." The provisions of this bill are referred to in a communication from our Washington correspondent, which will be found in another part of this issue. If injunctions can be treated with such contempt as the injunction against Gompers and his associates, trade unions hereafter can indulge in boycotting or in any other actions intended to carry out the "legitimate purposes" of their organizations, being assured that if they are prosecuted they can appeal from court to court and in time have the proceedings annulled by pleading the statute of limitations. The way has been pointed out very kindly by the United States Supreme Court.

The Colorado War

Months of violent warfare in two important mining communities have contributed little or nothing to the permanent solution of the questions involved. In the copper country of Michigan the miners' strike seems now to have subsided. In Colorado the Federal Government is at work in the hope of restoring peace. Both struggles grew out of the same question—labor union control over employees. Wide publicity has been given to the merits of the contentions in each case, but the average newspaper has shown such bias in favor of the labor unions as greatly to obscure the essential features of the employers' position. This is less true of the Colorado situation than of that in the Copper Peninsula; for on one day we read in a prominent Chicago paper, for example, the severest condemnation of the union leaders in Colorado while on the following day the same paper says of the copper strike: "What dictated the return of the men to the mines was starvation. The employers won because the strikers were prostrated and powerless to keep up their fight." And yet the circumstances of the two strikes could scarcely be more nearly parallel.

We cannot find that any prominence has been given by the daily press to the fact that the copper mining companies of the Keewenaw district repeatedly urged their employees to form a local organization and that they offered to contribute $50,000 to the erection of a home for the exclusive use of the miners' union. The operators' contention was only against the intrusion and dictation of a non-resident organization of evil reputation. It may not be widely known, moreover, that the miners referred to as "starved into submission" left the copper country in large numbers, almost at the beginning of the trouble. They went to the mines of the West, to the iron mining district of Lake Superior and to other parts of this country and Europe, but have now voluntarily returned seeking their old jobs under the old conditions.

The organization that stirred up the trouble in the copper country is the same that is responsible for the deplorable conflict in Colorado. Its record is blackened with strife. Wherever its head has been raised progress has been blocked. It is fortu-

nate that both in Michigan and in Colorado the leaders of these assaults upon the rights of the men they profess to serve have made their fight on employers who are not afraid to protect their men in the right to work, cost what it may. Failing in intimidation these leaders now assume the virtuous attitude of urging arbitration.

We believe in arbitration, where the dispute does not invade inherent rights. But the maintenance of an "open shop" is no more a debatable question than the right of property. It is possible for every accredited union to build a reputation for fair dealing and an appreciation of the equities of the relations between employer and employee. And under such conditions a labor difference might be approached with confidence that a right adjustment could be secured by arbitration. But thus far the record of the Western Federation of Miners has given no warrant for any such expectation. If one may accept the Colorado operators' statement there is large reason to doubt the right of the union involved to speak for the miners of that district.

Yet when all is said there remains a heavy responsibility upon the coal operators in Colorado for the restoration of peace to their industry. They will have to give the thousands of ignorant foreign miners more reasons than they have given them thus far for intrusting their interests to employers rather than to labor union leaders. The open shop can only make its way by convincing proof that it will do more for the worker in wages and in shop and living conditions than he can get through a militant union. In the steel industry and in some of the metal trades the demonstration has been made in a telling way. There is no other road to peace in the mining industry.

Brilliant Crop Prospects

But once in the last 26 years has the condition of winter wheat on May 1 surpassed the condition reported last week by the Department of Agriculture. It is unusual for an improvement to be shown in the month of April, but this year such has been the case. The average condition April 1 was 95.6, while on May 1 it was 95.9, against a 10-year average on May 1 of 85.5. The abandonment of area caused by winter killing has been exceptionally small. The report gives the area under cultivation this year at 35,387,000 acres, which is by far the greatest ever reported under winter wheat, and compares with 31,699,000 acres in 1913. The official estimate of this year's winter wheat crop is 630,000,000 bushels, which contrasts with 523,561,000 bushels in 1913, the previous record. The department figures also give the promise of a very satisfactory gain in the rye crop. It is further to be noted that the condition of hay lands and pastures on May 1 was above the average of recent years, while spring plowing and planting were well advanced.

If the political and international situation were satisfactory the glowing agricultural promise would undoubtedly prove a great stimulus to trade. But with drastic anti-trust legislation pending in Congress and the danger of actual warfare with Mexico, the Government crop report has fallen absolutely flat. Even the stocks of railroad companies serving the winter wheat section have not shown any response to the prospect thus held out of greatly increased earnings which those companies are sure to enjoy. Nevertheless, it is felt that if nothing happens to blight the brilliant crop prospects, and the harvest comes up to the figures now promised, an improvement in business of some considerable proportions must develop. Agriculture is still the foundation of our prosperity, and its exceptional vigor cannot fail to be felt in all channels of trade.

The Saloon and Industrial Works

A vigorous campaign is under way, particularly among foundries, against the location of saloons in close proximity to industrial works. The slogan is "Back with the saloon." The movement is not a new one, but hitherto it has not been so concerted. Owners realize that the employee who goes to work after taking alcohol into his system has a reduced efficiency and an increased liability to accident in his employment, especially if he operates machinery. If the temptation is at the gate of the mill or factory, or near enough to give the workman easy access to drink, especially during the noon hour for the day shift or just before beginning work for the night shift, he is much more apt to yield to the indulgence.

Experience has proved that an industrial plant separated from all drinking places has a minimum of accidents and of loss by idle hours. A great many casualties, more or less serious, have been traced to the influence of alcohol. In the case of the South Works of the American Steel & Wire Company, Worcester, Mass., for some years the licensing authorities drew a dead line some half a mile from the plant, and no saloon was located within that limit. Finally the authorities decided to grant a license for a saloon situated close to the mill gates. The curve of accidents ascended sharply. Various cases were traced directly to the drinking done in the noon hour. The victims were not drunk, but they had taken enough to make them either sleepy or reckless. They had lost their mental balance. Then the city voted "no license"; for two years the saloon near the wire plant was abandoned and the curve of accidents went down. When again a license was issued in the neighborhood the curve ascended. In the years of the last regime, with the saloon in operation, the company's careful education of its men as to the causes of accidents has had its effect in starting the curve downward again. But not one manufacturing plant in hundreds makes a systematic attempt to instill into the minds of its employees these lessons which mean so much not only in welfare to the workmen but in dollars and cents to the owners, for the accident victim or his dependents must be aided unless it can be proved that he was seriously under the influence of liquor when he sustained his injuries.

One phase of the saloon in its relation to the manufacturing plant has been given little or no consideration, and that is the kind of beverages dispensed. The most dangerous saloons in our cities are those generally found in a mill neighborhood. Their beers, wines and whiskies are notoriously bad. Analysis would prove their poisonous qualities. They produce most of the brawls and acts of

violence, according to the testimony of the police of every city. In the brain of a workman going to his employment they may be conducive to negligence of the most costly character. Most of these liquors would not pass the test of the pure food laws and on this ground prosecution of the saloon would be possible almost everywhere. The manufacturing plant cannot conduct a canteen. It cannot very well dispense even malt liquors to its employees. But in most cities and towns the owners can see to it that if their men are given alcoholic drinks in saloons in the neighborhood of the factories those drinks shall be pure of their kind.

CORRESPONDENCE

The Bethlehem By-Product Coke Plant

To the Editor: Notwithstanding the fact that much has appeared in the daily newspapers as well as in several technical journals respecting the alleged failure of the extensive by-product coke oven plant at South Bethlehem, Pa., it will perhaps be interesting to obtain authentic information from an authoritative source.

To begin with, the statements made in some daily newspapers are a distressing confusion of hearsay mingled with an evident ignorance of the facts. In one instance in particular the statements appearing in print are so at variance with the principles involved that we believe it hardly necessary to dignify them by a denial.

It appears to be the general tendency to consider the plant, as originally designed and constructed, a complete failure. This is very far indeed from the fact, as in some respects the design and results are superior to those of any plant in this country at the present date. That the operating results in some respects did not fulfill the expectations of the contractors, and hence requirements of the guarantees is a freely admitted fact. It is also a fact that in certain respects the operating results considerably exceeded the guarantees.

To summarize the situation, it may be said that the plant caused the greatest disappointment to its builders, as well as to its owners, through the failure to produce the expected daily output of coke. It was found difficult to effect a uniform heating of the oven walls without incurring the danger of local overheating of the refractory material. Shortly after this condition was discovered it was suggested that perhaps the refractory material was not sufficiently high in quality. It may not be amiss to mention here that the manufacturer, the Didier-March Company, of Perth Amboy, N. J., has successfully produced refractory material of unsurpassed quality for a considerable number of years, which fact is known to its many customers, including the largest gas works in the eastern United States and several in the Middle West.

It was then decided to investigate the possibility of utilizing silica material of other manufacture in the reconstruction of some of the oven walls. This was done on a large scale, but the capacity shown by the reconstructed ovens, under conditions which assured reasonable maintenance costs, were still so much at variance with the guarantees that it was finally decided to install an additional number of ovens. This was made necessary by the contractual relations existing among the parties in interest.

Although the experience at South Bethlehem is extremely regrettable to every fair-minded person conversant with the facts, it affords Americans a splendid and noteworthy example of the tenacity with which two representative German engineering firms adhered to their principles of fair business dealing and fulfillment of contractual obligations, without once considering or seeking any other means of escape from their obligations except full liquidation of the damages sustained.

Contrary to the generally accepted opinion, the South Bethlehem coke oven plant was not constructed by the Didier-March Company for its own account, but as agent for the Stettiner Chamotte-Fabrik, A.G., of Stettin, Germany, and the Berlin-Anhaltische Maschinenbau, A.G., of Berlin, Germany, according to plans and specifications prepared by the German companies. The control of the plant is now vested in its permanent operators, the Lehigh Coke Company, of South Bethlehem and New York, after a delay of some months.

In conclusion it may be stated that the two German companies which were among the unsuccessful bidders for the extension to the oven plant have no relation whatsoever to its original designers.

GEORGE A. BALZ.

NEW YORK, May 8, 1914.

Some Side Lines of Factory Efficiency

To the Editor: The principle of efficiency involves much more than mere motion study. If the laborer has to be efficient and well paid he has to be well taken care of; he becomes, in short, a specialist. Since the laborer is a potential specialist, efficiency demands that scientific employment of labor, factory hygiene and accident prevention become part of the programme.

Under the efficiency régime even the most unskilled laborer is chosen according to his ascertained physical aptitude and with some attention to his mental caliber, after which a medical examination follows. Having been employed, a man must eat and drink under proper conditions; he must bathe; his eyesight must be preserved. Truly the workman must pay a price for his place in the efficiency campaign. He will have a hard time in future, since the employer will not hire him without ascertaining whether fat or muscle lies under his shirt or whether or not he has flat feet.

Efficiency also demands that a workman shall do his allotted task under hygienic conditions. He shall have adequate air and light, freedom from dust, individual wash bowl and proper toilet facilities. All these tend to make him do his best work and keep his machines busy.

Loss of income through physical debility due to sickness or accident often forces the workman to seek for an increase of wages. He knows that in the ordinary course of events his income will be materially lessened by these circumstances. From these facts the guarding of machinery and consequent accident prevention are much to be desired. No man who fears an accident when working with inadequately guarded machinery can do his best work. Those who are in touch with workmen know that loss of time and consequently pay is an all-abiding fear with workmen, and their frequent failure to get adequate compensation leaves a grievance that rankles. A man's knowledge that a firm is anxious to minimize the risks of work gives him tangible evidence that his employer is interested in him, and he is therefore impelled to do far more than otherwise.

Employers who embark on the efficiency campaign should not neglect the etceteras.

J. D. HACKETT.

FLUSHING, L. I., N. Y., April 29.

Reference Libraries for the Shop Man

To the Editor: Believing that many of its workmen were ambitious and anxious to learn more than just what was required to hold their individual jobs, the Peerless Motor Car Company of this city instituted a campaign to get the men to spend some of their spare time in a branch of the public library, located near the plant. A few of the men went, thinking that by so doing they would "stand in" well with the management; but with most of the employees, who were foreigners and to whom the reading of technical work in English was too tedious to appeal, little was done save to have them register their names at the branch, and thus become recorded holders of book cards. But the men could not make their wants known in their own tongue and soon grew discouraged.

The fact that the men had tried to get service encouraged the company, and a factory library was es-

tablished in the main building of the plant, next to the timekeeper's office. Notices in different languages were conspicuously posted, and the timekeeper's assistant, a man who had held his place for many years and knew and could talk their mother tongue to most of the men who had been employed for any length of time, was made librarian.

The book and periodical list was carefully chosen and the factory library was a success from the start. Even the few minutes left of the noon hour were used by many of the men in reading instead of lounging around the entrance or runways. Since the establishment of the reading room the number of helpful and often valuable suggestions submitted by employees has been trebled, and many savings in methods and manufacture secured. The promulgation of "Safety First" literature has been greatly aided by the library, and the number of accidental injuries and consequent time and money losses cut to less than one-quarter the figure formerly obtaining. CHARLES C. LYNDE.

CLEVELAND, OHIO, May 6, 1914.

President Farrell Sees Early Improvement

At the annual dinner of the Iron and Steel Institute at London, May 7, President James A. Farrell, of the United States Steel Corporation, was among the speakers. His views on the outlook for the world's steel trade, as expressed on that occasion, were cabled as follows to New York:

"A close observer of the world's trade at the present time cannot fail to note throughout the world of commerce and finance that the prevailing tone is steadily improving and is now somewhat better than it has been in recent times.

"Because of the bettered tone of business, generally coupled with the stimulating effect of a variety of other circumstances which have occurred and are occurring, indications point toward the gradual emergence of the iron and steel industry from a comparatively unsatisfactory condition to one wherein confidence in the commercial world will be restored.

"More iron and steel is consumed every year. Prices are low at the present time, but production is apparently not being forced beyond the needs of current consumption and despite the bearish news which is chiefly responsible for the apathetic condition of the iron and steel markets, consumers are generally purchasing their current requirements and consumption is going on at a fairly good rate.

"I feel safe in advancing the opinion that improved trade conditions, not only as regards tonnage but also values, will prevail in the near future."

Large April Output of Copper

The report of the Copper Producers' Association for April shows the stock of copper on hand May 1 to be 70,337,001 lb. This is an increase of 5,727,682 lb. over the amount on hand April 1, the total then being 64,609,319 lb. The April statement of the association compares as follows with that for March:

	April. Pounds.	March. Pounds.
Stock of marketable copper of all kinds on hand at all points in the United States at the first of the month....	64,609,319	78,371,852
Production of marketable copper in the United States from all domestic and foreign sources in the month.....	151,500,531	145,651,982
Deliveries of marketable copper in the month:		
For domestic consumption.....	63,427,633	69,852,349
For export	82,345,216	89,562,166
Total	145,772,849	159,414,515
Stock of marketable copper of all kinds on hand at all points in the United States at the close of the month....	70,337,001	64,609,319

The total production of 151,500,531 lb. for April is a new high record for monthly output, being an increase of 5,848,549 lb. over March, which was 145,651,982 lb. The production for April, 1913, was 135,333,402 lb. The domestic consumption for April was 63,427,633 lb., a falling off from that of the previous month of 6,424,716 lb., which was a disappointment. Foreign deliveries, totaling 82,342,216 lb., were also less than the month of March by 7,216,950 lb., but they are large in comparison with the corresponding months of previous years.

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Steel Corporation Orders 376,000 Tons Less

The unfilled orders on the books of the United States Steel Corporation on April 30 were 4,277,068 tons, or 376,756 tons less than the amount reported March 31. The figures for April 30 are almost identical with those for December 31, 1913, which were 4,282,108 tons. The total on April 30 is the smallest since November 30, 1911, when the unfilled orders were 4,141,955 tons. The largest total on the movement of 1912 came at the end of that year—7,932,164 tons. Below is given a statement of unfilled tonnage for each month beginning with the high point of December 31, 1912:

April 30, 1914.....	4,277,068	July 31, 1913.....	5,399,356
March 31, 1914....	4,653,825	June 30, 1913.....	5,807,317
February 28, 1914..	5,026,440	May 31, 1913.....	6,324,329
January 31, 1914...	4,613,680	April 30, 1913.....	6,978,76.
December 31, 1913..	4,282,108	March 31, 1913.....	7,468,956
November 30, 1913.	4,396,347	February 28, 1913..	7,656,714
October 31, 1913...	4,513,767	January 31, 1913...	7,827,368
September 30, 1913.	5,003,785	December 31, 1912..	7,932,164
August 31, 1913....	5,223,468		

The American Steel Foundries reports a deficit of $163,353 for the quarter ended March 31. Earnings from operations in that quarter were only $46,251.

The Iron and Metal Markets

LOOKING FOR BETTERMENT

Actual Buying But Little Increased

Prices Generally Lower — Better Inquiry and Buying in Pig Iron

Anticipation of better things is now a factor in the steel market. In finished lines it has caused a more hopeful feeling, though little expansion in buying as yet, and in pig iron it is responsible for more inquiries and for some increase in actual business. There is no improvement in prices; rather they are lower both for pig iron and finished steel.

The fact that the end of a good many contracts was but a few weeks off has been of late the basis of predictions of a new buying movement that has not appeared. Now the imminence of the rate decision is added to the argument of depleted stocks.

Lower prices, particularly in plates, bars, wire and sheets, are themselves a sign of increasing interest by buyers; for some weeks not enough business has offered to bring out serious competition.

In the pig-iron market the measurable increase in activity has been, as under similar conditions before, at the expense of prices. In the Chicago district steel-making pig iron has been accumulating and rather than blow out a number of furnaces some makers have sold considerable basic iron at concessions, following the sale of 15,000 tons to a St. Louis steel foundry reported last week. In northern Ohio 15,000 tons of basic iron was sold, largely by Cleveland furnaces, at less than a $13 Valley furnace equivalent.

Foundry operations are in many sections on a 50 to 60 per cent. basis, and there has been a further slight curtailment in blast furnaces, so that the larger inquiry for iron in Central Western and Eastern markets is not specially significant.

English ferromanganese has eased off $1 a ton to $38 Baltimore, the low rate of steel works operations making a very quiet market since the heavy buying of late January at $35 and $36.

Steel works are running at practically the same rate of ingot production as in the past two weeks, indicating that the basis reached is mainly that of upkeep throughout the country.

In the structural trade the low prices of many months have given way to lower. New York elevated work brought up the April total in Eastern districts close to 100,000 tons. In the past week in the same districts the lettings were 11,000 tons. The Chesapeake & Ohio bridge over the Ohio to be let June 2, will call for 15,000 tons and in New York about 12,000 tons additional subway work will be let this month.

For the two new Government vessels—a transport and a supply ship—on which bids were opened this week at Washington, 7200 tons of plates and shapes will be bought, and competition for this steel has been keen. Nearly 3000 tons of plates will be bought for the Catskill water supply pipe line in Brooklyn, extending the system to the borough of Queens.

Chicago reports sales of plates at 1.28c., equivalent to 1.10c. Pittsburgh; of structural shapes at 1.30c. Chicago, and of bar iron at 1.10c. At Pittsburgh the increasing frequency of 1.10c. on plates is noted, the same price appearing also in some bar transactions.

The wire trade is having the experience of a good movement of products, as compared with some other lines, but with continued weakness in prices. An early demand for rods is looked for, a number of contracts expiring next month.

Implement makers realize that bar prices are low, but they have shown little interest in contracts for the year or half year beginning July 1. In fact, bargain buying is not a live issue in any part of the trade.

Cleveland iron ore firms look for a slow season. Some resale offering of 1913 ore is reported in the East slightly below the announced basis for 1914. In the Central West some lower grade ores have already been offered at less than the new basis.

Our English cable tells of weakness in steel products and of sharp cutting on some lines by Continental merchants. The Standard Oil Company placed another considerable contract for tin plates, but Welsh mills were too high to get the business.

A Comparison of Prices

Advances Over the Previous Week In Heavy Type, Declines In Italics

At date, one week, one month, and one year previous

	May 13, 1914.	May 6, 1914.	Apr. 15, 1914.	May 14, 1913.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	*$14.75*	$15.00	$15.00	$16.75
No. 2, Valley furnace....	13.00	13.00	13.25	14.50
No. 2 Southern, Cin'ti....	13.75	13.75	13.75	15.00
No. 2, Birmingham, Ala..	10.50	10.50	10.50	11.75
No. 2, furnace, Chicago*.	*14.00*	14.25	14.25	16.00
Basic, del'd, eastern Pa..	*14.00*	14.25	14.25	16.50
Basic, Valley furnace...	13.00	13.00	13.00	15.35
Bessemer, Pittsburgh....	14.90	14.90	14.90	17.90
Malleable Bess., Ch'go*..	*14.00*	14.25	14.25	16.00
Gray forge, Pittsburgh..	13.65	13.65	13.65	15.40
L. S. charcoal, Chicago..	15.75	15.75	15.25	18.00
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh..	20.00	20.00	21.00	28.00
O.-h. billets, Pittsburgh..	20.00	20.00	21.00	28.50
O.-h. sheet bars, P'gh...	21.00	21.00	22.00	29.50
Forging billets, base, P'gh.	25.00	25.00	25.00	36.00
O.-h. billets, Phila.....	22.40	22.40	23.40	28.00
Wire rods, Pittsburgh...	26.00	26.00	26.00	30.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	12.75	12.75	12.75	16.00
Iron rails, Philadelphia.	15.50	15.50	15.50	18.00
Carwheels, Chicago.....	11.50	11.50	11.50	14.75
Carwheels, Philadelphia.	11.75	11.75	12.00	13.50
Heavy steel scrap, P'gh.	11.50	11.50	11.50	13.50
Heavy steel scrap, Phila.	10.50	10.50	11.00	12.00
Heavy steel scrap, Ch'go	*9.75*	10.00	9.50	11.25
No. 1 cast, Pittsburgh..	11.50	11.50	11.50	13.75
No. 1 casts, Philadelphia	12.50	12.50	13.00	13.50
No. 1 cast, Ch'go (net ton)	*10.00*	10.25	10.25	11.50
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	1.20	1.20	1.22½	1.57½
Iron bars, Pittsburgh...	1.30	1.30	1.30	1.70
Iron bars, Chicago.....	1.10	1.10	1.12½	1.57½
Steel bars, Pittsburgh...	1.15	1.15	1.15	1.70
Steel bars, New York...	1.31	1.31	1.31	1.86
Tank plates, Pittsburgh.	1.15	1.15	1.15	1.60
Tank plates, New York..	1.31	1.31	1.31	1.76
Beams, etc., Pittsburgh..	1.15	1.15	1.15	1.50
Beams, etc., New York..	1.31	1.31	1.31	1.66
Skelp, grooved steel, P'gh	1.20	1.20	1.20	1.45
Skelp, sheared steel, P'gh	1.25	1.25	1.25	1.50
Steel hoops, Pittsburgh..	1.25	1.25	1.25	1.60
Sheets, Nails and Wire,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	1.85	1.85	1.90	2.30
Galv. sheets, No. 28, P'gh	*2.80*	2.85	2.90	3.40
Wire nails, Pittsburgh..	*1.55*	1.60	1.60	1.80
Cut nails, Pittsburgh...	*1.60*	1.65	1.65	1.70
Fence wire, base, P'gh...	*1.35*	1.40	1.40	1.60
Barb wire, galv., P'gh...	*1.95*	2.00	2.00	2.20

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville, Per Net Ton at Oven:	May 13, 1914.	May 6, 1914.	Apr. 15, 1914.	May 14, 1913.
Furnace coke, prompt...	$1.75	$1.85	$1.90	$2.20
Furnace coke, future....	2.00	2.00	2.00	2.25
Foundry coke, prompt..	2.40	2.40	2.40	2.85
Foundry coke, future...	2.50	2.50	2.50	2.90

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.	14.37½	14.50	14.75	16.00
Electrolytic copper, N. Y.	14.12½	14.20	14.37½	15.75
Spelter, St. Louis.....	**5.00**	4.85	5.10	5.35
Spelter, New York.....	**5.15**	5.00	5.25	5.50
Lead, St. Louis.....	3.80	3.80	3.67½	4.20
Lead, New York.....	3.90	3.90	3.80	4.35
Tin, New York.....	**33.70**	33.10	36.40	49.62½
Antimony, Hallett's, N. Y.	**6.85**	6.75	6.75	8.25
Tin plate, 100-lb. box, P'gh	$3.30	$3.30	$3.30	$3.60

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh, in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.15c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturer's standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in....	.10
Gauges under 3-16 in. to and including No. 8....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10...	.30
Gauges under No. 10 to and including No. 12...	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles 3 ft. in diameter and over.....	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft., to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.15c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs.	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909....	.70
Tees, structural sizes (except elevator, hand rail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.35; galvanized, $1.75. Galvanized barb wire and fence staples to jobbers, $1.95; painted, $1.55. Wire nails to jobbers, $1.55. Prices of the foregoing wire products to dealers in carload lots are 5c. higher. Woven wire fencing, 73½ per cent. off list for carloads; 72½ off for 1000-rod lots; 71½ off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.55	$1.60	$1.65	$1.70	$1.80	$1.90	$2.00	$2.10
Galvanized	2.00	2.00	2.05	2.10	2.20	2.30	2.70	2.80

Wire Rods.—Bessemer, open-hearth and chain rods, $26.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from April 20, 1914, and iron pipe from June 2, 1913, all full weight:

Butt Weld

Steel. Inches	Black	Galv.	Iron. Inches	Black	Galv.
⅛, ¼ and ⅜	73	52½	⅛ and ¼	66	47
½	77	66½	⅜	65	46
¾ to 3	80	71½	½	69	56
			¾ to 2½	72	61

Lap Weld

2	77	68½	1¼	56	45
2½ to 6	79	70½	1½	67	56
7 to 12	76	65½	2	68	58
13 to 15	53	..	2½ to 4	70	61
			4½ to 6	70	61
			7 to 12	68	55

Reamed and Drifted

1 to 3, butt	78	69½	1 to 1½, butt	70	59
2, lap	75	66½	2, butt	70	59
2½ to 6, lap	77	68½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap	68	59

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	68	57½	⅜	63	52
½	73	66½	½	67	60
¾ to 1½	77	70½	¾ to 1½	71	62
2 to 3	78	71½	2 and 2½	72	63

Lap Weld, extra strong, plain ends

2	74	65½	1½	65	59
2½ to 4	76	67½	2	66	58
4½ to 6	75	66½	2½ to 4	70	61
7 to 8	68	57½	4½ to 6	69	60
9 to 12	63	52½	7 and 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends

½	63	56½	½	57	49
¾ to 1½	66	59½	¾ to 1½	60	52
2 to 2½	68	61½	2 and 2½	62	54

Lap Weld, double extra strong, plain ends

2	64	57½	2	55	49
2½ to 4	66	59½	2½ to 4	60	54
4½ to 6	65	58½	4½ to 6	59	53
7 to 8	58	47½	7 to 8	52	42

To the large jobbing trade an additional 5 and 2½ per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from May 1, 1914, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	62	1½ in.	45
2¼ in.	59	1¾ and 2 in.	49
2½ and 2¾ in.	65	2¼ in.	45
3 and 3¼ in.	70	2½ to 2¾ in.	54
3½ to 4½ in.	72	3 and 3¼ in.	57
5 and 6 in.	65	3½ to 4½ in.	60
7 to 13 in.	62	5 and 6 in.	49

Locomotive and steamship special charcoal grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.30 to 1.35
Nos. 9 to 10	1.35 to 1.40
Nos. 11 and 12	1.40 to 1.45
Nos. 13 and 14	1.45 to 1.50
Nos. 15 and 16	1.55 to 1.60

Box Annealed Sheets, Cold Rolled

Nos. 10 and 11	1.50 to 1.55
No. 12	1.50 to 1.55
Nos. 13 and 14	1.55 to 1.60
Nos. 15 and 16	1.60 to 1.65
Nos. 17 to 21	1.65 to 1.70
Nos. 22 and 24	1.70 to 1.75
Nos. 25 and 26	1.75 to 1.80
No. 27	1.80 to 1.85
No. 28	1.85 to 1.90
No. 29	1.90 to 1.95
No. 30	2.00 to 2.05

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	1.80 to 1.85
No. 12	1.90 to 1.95
Nos. 13 and 14	1.90 to 1.95
Nos. 15 and 16	2.05 to 2.10
Nos. 17 to 21	2.20 to 2.25
Nos. 22 and 24	2.35 to 2.40
Nos. 25 and 26	2.50 to 2.55
No. 27	2.65 to 2.70
No. 28	2.80 to 2.85
No. 29	2.95 to 3.00
No. 30	3.10 to 3.15

Pittsburgh

PITTSBURGH, PA., May 12, 1914.

Sentiment in the steel trade is little better. The feeling is pretty general that a buying movement, probably similar to the one that took place in January and February, may be expected some time in June. It is pointed out that new buying for three or four months has been light, and that jobbers and consumers will soon be forced to come into the market to replenish depleted stocks. Reliable information is that a decision in the freight rate case may be expected this month. Operations of the steel companies are steadily lessening and are not averaging over 60 per cent. New buying is from hand to mouth only. Prices on finished lines are weak, with not enough business coming out to test them seriously. Blue annealed and galvanized sheets are slightly lower, and prompt furnace coke has gone off about 10c. a ton. The scrap trade is still neglected.

Pig Iron.—It is understood that a Canton, Ohio, steel plant has closed for 15,000 tons of basic iron for third quarter delivery, the business having been taken by a Cleveland furnace interest. Nothing has been given out as to the price paid for this iron, but as Cleveland has a 75c. freight rate to Canton, it is figured that the iron did not bring above $12.75 at furnace, equal to $13.50 delivered, and possibly a lower price was made. There is no new inquiry in the local market, and prices on pig iron are purely nominal as follows: Bessemer, $14; basic, $13; No. 2 foundry, $13 to $13.50; gray forge, $12.75 to $13; malleable Bessemer, $13.25, for delivery through first half of this year, all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 90c. a ton.

Billets and Sheet Bars.—No new business is being offered in billets and sheet bars and prices are nominal. On a round tonnage of billets $20 could be shaded, and the same condition applies to sheet bars. Steel mills report specifications for bars from tin plate mills as fairly active, but from the sheet mills very dull. We quote Bessemer and open-hearth billets at $20, and Bessemer and open-hearth sheet bars at $21, f.o.b., makers' mills, Pittsburgh or Youngstown, for May and June delivery; forging billets, $25 on desirable specifications, embracing only one size, and up to but not including 10 x 10 in., the regular extras being charged for larger sizes. On small orders forging billets are held at $26. We quote axle billets at $23 for desirable orders and $24 for small orders.

Muck Bar.—We quote nominally at $27, delivered, for best grades made from all pig iron. Eastern muck bar is being offered in this market at a lower price.

Steel Rails.—It develops that the order for 12,000 tons of steel rails placed by the Erie Railroad with the Carnegie Steel Company was awarded several months ago, but the specifications did not reach the company until recently. Only small orders are being placed for standard sections, and it is not expected that large contracts will come out, except in a few cases, until after the freight rate decision is made. The new demand for light rails continues fairly active, the Carnegie Company having received new orders and specifications for about 2500 tons the past week. The general demand for track supplies is very quiet. We quote splice bars at 1.50c.; standard section Bessemer rails, 1.25c.; open-hearth standard sections, 1.34c., f.o.b. Pittsburgh. We quote light rails rolled from billets as follows: 25, 30, 35, 40 and 45 lb. sections, 1.10c.; 16 and 20 lb., 1.15c.; 12 and 14 lb., 1.20c., and 8 and 10 lb., 1.25c., in carload lots, f.o.b. Pittsburgh. For large lots, these prices might be slightly shaded.

Ferroalloys.—There is practically no new buying of either ferromanganese or ferrosilicon, as consumers are covered for some time ahead. An occasional carload of ferromanaganese is resold at $38, f.o.b. Baltimore. The price of English 80 per cent. ferromanganese has been $39, Baltimore, but it is understood one maker has quoted $38 in the past week. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71, delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is $19; 11 per cent., $20, and 12 per cent., $21, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Plates.—A very good line on the price situation in plates will probably be given when announcement is made of bids opened at Washington, D. C., on Tuesday for the two new Government boats, one of which is a transport and the other a supply ship. The transport will require about 4200 tons of plates and shapes and a few bars, and the supply ship about 3000 tons. No new orders for steel cars have been given out, and none is expected until the freight rate case is decided. It is known that railroads have requisitions piled up for cars and track supplies. Even if the 5 per cent. advance in freight rates is refused, considerable railroad buying is expected as soon as the decision is announced. The new demand for plates is dull, and as a rule mills are not running to more than 50 to 60 per cent. of capacity. The steel car companies have little work, one local interest not operating to more than 20 per cent. of capacity. We quote ¼-in. and heavier plates at 1.15c., Pittsburgh, but this price has been shaded in some cases. The Beaver Engineering & Contracting Company, New York City, is in the market for 3000 tons of ½ and 7/16-in. sheared steel plates for the building of a pipe line in Brooklyn, which is to be part of the Catskill aqueduct.

Skelp.—The new demand is dull, and none of the mills rolling skelp is running full, owing to lack of orders. We quote: Grooved steel skelp, 1.20c. to 1.25c.; sheared steel skelp, 1.25c. to 1.30c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., delivered to consumers' mills in the Pittsburgh district.

Structural Material.—No orders of moment were placed in this market last week. Work on the plans for the new William Penn Hotel in this city are being pushed, and bids on the steel are expected to be asked for within three or four weeks. This building will take about 6000 tons. Bids have gone in on the new Oliver avenue theater in this city, 1000 to 1200 tons. New inquiry is fair, but a good deal of complaint is being made by fabricators as to the low prices going, which, it is asserted, leave very little profit. Plans were sent out last week for the proposed Chesapeake & Ohio Railroad bridge over the Ohio River at Portsmouth, and bids are to go in June 2. This job will require about 15,000 tons. We quote beams and channels up to 15-in. at 1.15c.

Wire Rods.—The market is very dull, new demand being quiet, and consumers are not specifying freely on contracts placed some time ago. A good many contracts for wire rods expire July 1, and some new buying is looked for in June. We quote Bessemer, open-hearth and chain rods at nominally $26, Pittsburgh. This price could be shaded on a good purchase.

Sheets.—No improvement is seen in the sheet trade. Prices on blue annealed and galvanized are lower. New buying is from hand to mouth, and specifications on contracts are slow. None of the mills is running to more than 50 to 60 per cent. of capacity. We quote Nos. 9 and 10 blue annealed sheets at 1.35c. to 1.40c.; No. 28 Bessemer black at 1.85c. to 1.90c.; No. 28 galvanized at 2.85c. to 2.90c.; No. 28 black plate, tin mill sizes, H. R. and A., 1.90c.; Nos. 29 and 30, 1.95c. These prices are for carload lots, f.o.b. Pittsburgh, jobbers charging the usual advances for small lots from store.

Tin Plate.—Mills are running to nearly 100 per cent. of capacity on contract specifications, but in the past

two or three weeks there has been a falling off in new specifications. The American Sheet & Tin Plate Company is operating this week to 94 per cent. of capacity, having six mills down at one plant on account of a broken engine, while its Demmler, Connellsville and Monongahela plants have not been operated for a long time. New orders are only fair and for small lots, and on these we quote 100-lb. 14 x 20 cokes at $3.30 to $3.40, and 100-lb. 14 x 20 ternes, $3.20 to $3.30 per base box, f.o.b. Pittsburgh.

Iron and Steel Bars.—Makers report that the demand for both iron and steel bars is quiet, and mostly for small lots to cover current needs. Specifications on steel bars from large consumers, such as the implement trade and wagon builders, are much lighter than usual for the season and in volume are far behind what was being done at this time last year. There are reports of steel bars having been sold in some special cases below 1.15c., makers' mills. Mills rolling iron bars are not running to more than 50 to 60 per cent. of capacity and have very little work ahead. We quote steel bars at 1.15c. and common iron bars at 1.30c., f.o.b. makers' mills, Pittsburgh. Regular extras for twisting reinforcing steel bars over the base price are as follows: ¾-in. and over, $1; ½ to 11/16-in., $1.50; under ½-in., $2.50 per net ton. These extras are not always observed.

Wire Products.—Several makers report that specifications against contracts placed at $1.55 for wire nails are coming in fairly well, but the new demand for wire and wire nails is quiet and only for small lots. Prices on wire and wire nails have been weak for some time, and on new orders $1.55 is being done on nails and $1.35 on plain annealed wire. We quote wire nails at $1.55 to $1.60; plain annealed wire, $1.35 to $1.40; galvanized barb wire and fence staples, $1.95 to $2; painted barb wire, $1.55 to $1.60, all per 100 lb., f.o.b. Pittsburgh, with actual freight added to point of delivery, terms being 30 days net less 2 per cent. off for cash in ten days. We quote cut nails at $1.65, f.o.b. Pittsburgh. Discounts on woven wire fencing are 73½ per cent. off in carload lots 72½ per cent. off on 1000-rod lots and 71½ per cent. on less than 1000-rod lots, all f.o.b. Pittsburgh.

Hoops and Bands.—The new demand for both hoops and bands is only for small lots. Consumers are covered on contracts to July 1 or longer, but specifications are only fair. Not enough business is coming out to test prices. We quote steel bands at 1.15c., with extras as per steel bar card, and steel hoops at 1.25c., f.o.b. Pittsburgh. It is stated that prices on both hoops and bands have been shaded $1 a ton.

Shafting.—Quiet conditions prevail, the new demand being only for small lots to cover current needs. It is said that two or three automobile builders are specifying for fairly large quantities of shafting, but from the others new business is very light. We quote cold-rolled shafting in carload lots at 65 to 66 per cent. off, and small lots 63 per cent. off, delivered in base territory.

Spikes.—One local maker of spikes has had its factory closed down last week and this week on account of the dull business conditions. Railroads are buying from hand to mouth, and no large inquiries are in the market. Specifications against contracts placed early in the year are dull. We quote standard sizes of railroad spikes at $1.40 and small railroad and boat spikes at $1.50, f.o.b. Pittsburgh.

Merchant Steel.—The new demand for seasonable steels is fair, but mostly in small lots to cover current needs, and specifications are unsatisfactory. Prices are weak, and on small lots are about as follows: Iron finished tire, ½ x 1½ in. and larger, 1.30c., base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Rivets, Nuts and Bolts.—Makers report that the new demand for nuts and bolts is only equal to 35 to 40 per cent. of capacity, and specifications against contracts are not coming in freely. The new demand for rivets is dull, as boiler and locomotive shops are running only part time. We quote button-head structural rivets at 1.60c. to 1.65c. and cone-head boiler rivets at 1.70c. to 1.75c., in carload lots, an advance of about $2 a ton over these prices being charged for small lots. Terms, 30 days net, less 2 per cent. for cash in 10 days. Discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of makers' works:

Coach and lag screws	80 and 5% off
Small carriage bolts, cut threads	80% off
Small carriage bolts, rolled threads	80 and 5% off
Large carriage bolts	75 and 5% off
Small machine bolts, cut threads	80 and 5% off
Small machine bolts, rolled threads	80 and 10% off
Large machine bolts	75 and 10% off
Machine bolts, c.p.c. & t nuts, small	80% off
Machine bolts, c.p.c. & t nuts, large	75 and 5% off
Square h.p. nuts, blanked and tapped	$6.30 off list
Hexagon nuts	$7.20 off list
C.p.c. and r sq. nuts, blanked and tapped	$6.00 off list
Hexagon nuts, ⅜ and larger	$7.20 off list
Hexagon nuts, smaller than ½ in.	$7.80 off list
C.P. plain square nuts	$5.50 off list
C.P. plain hexagon nuts	$5.90 off list
Semi-fin. hex. nuts, ½ in. and smaller,	85, 10 & 10% off
Semi-fin. hex. nuts, ⅝ in. and larger	85 & 5% off
Rivets, 7/16 x 6½, smaller & shorter	80, 10 & 5% off
Rivets, metallic tinned, bulk	80, 10 and 10% off
Rivets, tin plated, bulk	80, 10 and 10% off
Rivets, metallic tinned, packages	80, 10 and 5% off
Standard cap screws	70, 10 and 10% off
Standard set screws	75, 10 and 10% off

Standard Pipe.—Several leading makers of steel pipe report that indications favor a heavier demand in the near future. One leading interest recently made a careful canvass of the business outlook in the territory west of Chicago and reports it very favorable. At present pipe mills are running to about 50 to 60 per cent. of capacity. Discounts on iron and steel pipe are being well maintained.

Boiler Tubes.—A slightly better demand is reported for locomotive tubes, but new business in merchant tubes is light. The new discounts on steel tubes adopted May 1 are being only fairly well held.

Old Material.—The heavy steel scrap in the list of the Pennsylvania Lines West that closed last week went on the basis of about $12.25 per gross ton, delivered Steubenville, Ohio, and about the same price delivered Alliance, Ohio. At the latter place it was bought by a consumer and at Steubenville by a dealer. Consumers of scrap have been buying very little for some months, and for this reason dealers are looking for a better demand in the near future. Sales are reported of about 1300 tons of selected heavy steel melting scrap at $12.50, delivered, and 500 tons of wrought-iron turnings at $7.75, delivered. Dealers quote, per gross ton, for delivery to consumers' mills in the Pittsburgh and nearby districts that take the same rates of freight as follows:

Selected heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$12.00 to	$12.25
Ordinary steel melting scrap	11.50 to	11.75
Compressed side and end sheet scrap	11.25 to	11.50
No. 1 foundry cast	11.50 to	11.75
No. 2 foundry cast	10.25 to	10.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.75 to	9.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.75 to	13.00
No. 1 railroad malleable stock	11.00 to	11.25
Railroad grate bars	10.25 to	10.50
Low phosphorus melting stock		14.50
Iron car axles	22.50 to	23.00
Steel car axles	15.50 to	16.00
Locomotive axles, steel	20.00 to	20.50
No. 1 busheling scrap	10.25 to	10.50
No. 2 busheling scrap	7.25 to	7.50
Machine shop turnings		7.75
Old carwheels	11.25 to	11.50
Cast-iron borings		7.75
†Sheet bar crop ends	12.00 to	12.25
Old iron rails	13.75 to	14.00
No. 1 railroad wrought scrap	11.50 to	11.75
Heavy steel axle turnings	8.50 to	8.75
Heavy breakable cast scrap	12.00 to	12.25

†Shipping point.

will accept as low as $14.80, while some grades of No. 2 X are quoted at $14.75. The pipe foundries are taking little or no iron. With them business is slow and prices are being cut severely and openly. A prominent dealer in basic asserts that he knows of not a single inquiry, while others say there has been some talk with regard to purchasing steel-making iron, but it has not resulted in sales. A peculiarity of the situation is that some consumers who ordinarily buy from 1000 to 2000 tons at a time now content themselves with taking 100 or 200 tons, this being true of at least one having a good bit of work on hand. Virginia iron has been more quiet than Northern. The following range of prices represents the general market for near delivery in buyers' yards in this district:

Eastern Penna. No. 2 X foundry	$14.75 to $15.25
Eastern Penna. No. 2 plain	14.50 to 14.75
Virginia No. 2 X foundry	15.55 to 15.75
Virginia No. 2 plain	15.30 to 15.55
Gray forge	13.75 to 14.00
Basic	14.00
Standard low phosphorus	21.00

Ferroalloys.—Occasional sales of carload lots of 80 per cent. ferromanganese constitute the only transactions. Quotations are now $38, seaboard, for English or German. Quotations for 50 per cent. ferrosilicon range from $71 to $73, Pittsburgh, according to quantity. Offerings of foreign ferrosilicon have ceased since the sellers were warned that they were liable for infringement of patent.

Billets.—Specifications are only fair at best and do not insure activity far ahead. Prices continue weak at $22.40 to $23.40 for open-hearth rolling billets, with forging steel at the customary advance of $4 to $5 per ton, according to specifications.

Structural Material.—The Delaware, Lackawanna & Western Coal Company has placed with the Guerber Engineering Company a contract for the coal breaker to be erected near Wilkes-Barre, which will take about 1000 tons. It is understood that the same company has in contemplation another and similar breaker. The North Philadelphia bridge of the Pennsylvania Railroad, 250 tons, heretofore referred to, is understood to have gone to the Riter-Conley Mfg. Company. The city of Philadelphia is in the market for a bridge over Darby creek, requiring about 150 tons. Tangible items of importance are few and the market anything but satisfactory. For highly desirable business the quotation is 1.25c., Philadelphia, with the common run of business at 1.30c. and jobbing lots at 1.35c.

Bars.—Iron bars show no increased demand, with prices unchanged at 1.20c. to 1.25c., delivered here. For concrete reinforcing bars merchants report a little better demand. Quotations range from 1.25c. to 1.30c., Philadelphia, the lower price obtainable for large lots only.

Old Material.—Dullness continues, with prices well held. No betterment is expected until the demand for finished products picks up. The following quotations about represent the market for deliveries in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates varying from 35c. to $1.35 per gross ton:

No. 1 heavy melting steel	$10.50 to $11.00
Old steel rails, rerolling	12.25 to 12.75
Low phosphorus heavy melting steel scrap	14.50 to 15.00
Old steel axles	14.00 to 14.50
Old iron axles (nominal)	20.00 to 21.00
Old iron rails (nominal)	15.50 to 16.00
Old carwheels	11.75 to 12.25
No. 1 railroad wrought	12.50 to 13.00
Wrought-iron pipe	10.00 to 10.50
No. 1 forge fire	8.00 to 8.50
Bundled sheets	8.00 to 8.50
No. 2 light iron	5.00 to 5.50
No. 2 busheling	8.00 to 8.50
Wrought turnings	7.50 to 8.00
Cast borings	8.00 to 8.50
No. 1 cast	12.50 to 13.00
Grate bars, railroad	8.50 to 9.00
Stove plate	8.75 to 9.25
Railroad malleable	9.00 to 9.50

Coke.—Standard Connellsville furnace coke, or its equivalent, continues firm, but quiet, at $2 per net ton at oven for contract, with prompt at $1.85 to $1.90. In foundry coke not much interest is shown, although a great many contracts expire June 30. Prompt foundry can be had at $2.35 to $2.50 per net ton at oven, while the nominal price of contract coke is about $2.50, with choice grades running higher. Freight rates to this city from the producing districts are as follows: Connellsville, $2.05; Mountain, $1.65; Latrobe, $1.85.

Plates.—The building of two Government boats, bids on which have been submitted, promises the requirement of about 6000 tons of plates and 2000 tons of shapes. The Harlan & Hollingsworth Corporation has secured a contract for the building of a 300-ft. steamer for the Pacific coast. Current orders have continued to be of the small, miscellaneous character so prevalent of late. The lack of demand from the railroads is keenly felt. On sufficiently attractive business 1.25c. Philadelphia can be done, smaller lots commanding 1.30c.

Sheets.—Where the quantity is sufficiently large to be an inducement, makers will sell No. 10 blue annealed sheets at 1.50c., Philadelphia, with less desirable lots still calling for 1.55c.

Cleveland

CLEVELAND, OHIO, May 12, 1914.

Iron Ore.—The ore market is exceedingly dull, very little buying, as was expected, having followed the establishment of season's prices. Furnacemen expect to have no trouble whatever this season in securing the ores that they want and will take their time about buying. While most of the leading ore firms are adhering to the new prices, there are already reports of some shading of base prices. However, it appears that price shading so far has been limited to low grade ores. Ore carrying charges have practically been fixed at the 1912 rate, which is a reduction of 5c. a ton from the 1913 rate or 40c. from the head of the lakes. So far there has been very little chartering of outside tonnage for the ore trade. We quote prices as follows: Old range Bessemer, $3.75; Messaba Bessemer, $3.50; old range non-Bessemer, $3; Messaba non-Bessemer, $2.85.

Pig Iron.—A northern Ohio steel company has bought 15,000 tons of basic iron for the third quarter delivery on the inquiry noted last week. While information as to the price paid is withheld, it is believed that the business was placed on the basis of about $13, Valley furnace. There is little demand for Northern foundry iron, the only sales reported being small lots for delivery before July 1. Several Southern producers have opened their books for last half contracts at the current price of $10.50, Birmingham, for No. 2, and some business is being placed for that delivery. We note the sale of 450 tons of No. 2 Southern to a Cleveland consumer for the last half and a local inquiry for 400 tons of No. 1 for the same delivery. A northern Ohio stove plant is in the market for 750 tons of Southern iron for delivery in seven months, beginning June 1. Prices are unchanged. We quote, delivered Cleveland, as follows:

Bessemer	$14.90
Basic	13.90
Northern No. 2 foundry	14.25
Southern No. 2 foundry	14.85
Gray forge	13.50
Jackson Co. silvery, 8 per cent. silicon	17.55
Standard low phosphorus, Valley furnace	20.50

Coke.—Spot furnace coke is weaker, being quoted at $1.85 per net ton at oven, and this price can probably be shaded 5c. There is an increasing surplus of foundry coke as foundries are not taking shipments and new demand is lacking. We quote standard 72-hr. foundry coke at $2.40 to $2.65.

Finished Iron and Steel.—Sentiment shows an improvement and some sellers report a slightly better volume of current orders. Some of the implement manufacturers are inquiring for steel bar prices for the coming year, but sellers generally are trying to avoid making quotations at the present time. In some cases quotations higher than the prevailing 1.15c. price have been made for delivery to January 1 with no expectation of closing contracts at the prices quoted. New demand for steel bars is light and there is practically no demand for iron bars. Steel bars, structural material and plates are quoted at 1.15c., Pittsburgh, for carloads, but some of

the smaller mills are shading plates $1 a ton. We quote iron bars at 1.20c., Cleveland. Structural material is in light demand. The Burger Iron Company, Akron, has taken 700 tons for additions to the plant of the Firestone Tire & Rubber Company. The Cleveland Railway Company will shortly place contracts for several new buildings that will require about 1500 tons. The Marion Steam Shovel Company will require about 350 tons for a crane runway. The demand for sheets is not active and there are rumors that the regular quotations of 1.85c. for No. 28 black and 2.85c. for No. 28 galvanized are being shaded. We quote warehouse prices at 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts and Rivets.—Bolts and nuts are in light demand, buying being only in small lots for immediate delivery. Rivet prices are unchanged at 1.55c. for structural and 1.65c. for boiler rivets for round lots. We quote discounts as follows: Common carriage bolts, ⅝ x 6 in. smaller or shorter, rolled thread, 80 and 5 per cent.; cut thread, 80 per cent.; larger or longer, 75 and 5 per cent.; machine bolts with h.p. nuts, ¾ x 4 in., smaller or shorter, rolled thread, 80 and 10 per cent.; cut thread, 80 and 5 per cent.; larger or longer 75 and 10 per cent.; coach and lag screws, 80 and 15 per cent.; square h.p. nuts, blank or tapped, $6.30 off; hexagon h.p. nuts, blank or tapped, $7.20 off; c. p. c. and t. square nuts, blank or tapped, $6 off; hexagon, ⅝ in. and larger, $7.20 off; 9-16 in. and smaller, $7.80 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10 and 5 per cent.; 9-16 in. and smaller, 85, 10, 10 and 5 per cent.

Old Material.—The local market continues very dull. Valley mills are buying a limited amount of scrap and are offering $11.75 for heavy melting steel, although some has brought a slightly higher price. We note the sale of about 1000 tons of steel knuckles and couplers to a Valley consumer. Cleveland mills are entirely out of the market and are taking little material on contract. Prices are weak, but quotations are unchanged. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails, rerolling	$11.50 to $12.00
Old iron rails	13.50 to 14.00
Steel car axles	15.00 to 15.25
Heavy melting steel	10.25 to 10.75
Old carwheels	11.50 to 12.00
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	8.50 to 9.00
Railroad malleable	10.75 to 11.00
Light bundled sheet scrap	7.50 to 8.00

Per Net Ton

Iron car axles	$17.25 to $18.25
Cast borings	5.75 to 6.25
Iron and steel turnings and drillings	5.25 to 5.50
Steel axle turnings	6.75 to 7.25
No. 1 busheling, new	8.50 to 8.75
No. 1 busheling, old	8.00 to 8.25
No. 1 railroad wrought	9.50 to 10.00
No. 1 cast	10.50 to 10.75
Stove plate	7.50 to 8.00

Cincinnati

CINCINNATI, OHIO, May 13, 1914.—(*By Wire.*)

Pig Iron.—There are practically no encouraging features to report. The foundry melt has been gradually declining in this vicinity. The consumption of basic iron is more nearly normal. Southern prices are soft but nothing below $10.50, Birmingham basis, has been done for nearby shipment. Well authenticated reports are circulated that strictly last half contracts would probably be acceptable at the same figure. The lower foundry grades are now generally quoted with only 25c. a ton differential and a few carload sales have been made on this basis. Northern iron is held at $13.50, Ironton, and it is reported that preparations are being made to reduce the output in the Hanging Rock district. Numerous requests to hold up shipments on contracts tend to give the situation a somewhat pessimistic turn but both sellers and buyers are practically agreed that prices have about struck bottom. The delayed shipments on old contracts will tend to hold up contracting for last half requirements, as many foundries have enough iron to carry them through the third quarter. A few small lots of Ohio high silicon iron have been sold, augmenting the comparatively large sales recently reported. The very slow demand for malleable is attributed to the absence of railroad buying. The agricultural implement manufacturers are also holding back in signing up for future wants. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$14.25 to $14.75
Southern coke, No. 2 f'dry and 2 soft	13.75 to 14.25
Southern coke, No. 3 foundry	13.25 to 13.75
Southern No. 4 foundry	12.75 to 13.25
Southern gray forge	12.25 to 12.75
Ohio silvery, 8 per cent. silicon	17.20 to 17.70
Southern Ohio coke, No. 1	15.70 to 16.20
Southern Ohio coke, No. 2	14.70 to 15.20
Southern Ohio coke, No. 3	14.45 to 14.70
Southern Ohio malleable Bessemer	14.70 to 15.20
Basic, Northern	14.70 to 15.20
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(*By Mail*)

Coke.—Although the foundries usually contract for a future supply about this time, no interest is taken in the situation. The majority have enough due on contracts to keep running for some time, at their present rate of consumption. Only a few carloads are being moved on new orders, although there is not much complaint about shipments held up on old contracts. Connellsville and Wise County 72-hr. coke is quoted around $2.50 to $2.75 per net ton at oven, but it is stated that 15c. a ton lower can be done on a few Pocohontas brands. Furnace coke is about the same in all three districts, ranging from $1.80 to $2 at oven, and there is no contracting to be reported.

Finished Material.—The local demand is very light. The uncertainty as to the labor situation is holding back much work that would require structural material. Mill agencies here also report a dearth of orders from the railroads for track material. Sheets are quiet, but there is a slightly better inquiry. Store prices on steel bars remain at 1.75c., and on structural shapes 1.85c. Based on No. 28, we quote black sheets at 2c. to 2.05c., and galvanized at 3c. to 3.05c., f.o.b. cars Cincinnati, or Newport, Ky.

Old Material.—The larger users of scrap are said to be holding up shipments on contracts, while the smaller consumers are only using about 50 per cent. of the usual tonnage. There is a considerable amount of scrap iron on the market, and, as a consequence, prices are weak and have receded an average of about 25c. a ton on all grades. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$6.75 to $7.25
Old iron rails	11.75 to 12.25
Relaying rails, 50 lb. and up	19.75 to 20.25
Rerolling steel rails	10.75 to 11.25
Melting steel rails	9.25 to 9.75
Old carwheels	10.25 to 10.75

Per Net Ton

No. 1 railroad wrought	$8.75 to $9.25
Cast borings	4.50 to 5.00
Steel turnings	4.50 to 5.25
Railroad cast scrap	9.25 to 9.75
No. 1 machinery cast scrap	10.25 to 11.25
Burnt scrap	6.00 to 6.75
Old iron axles	16.75 to 17.25
Locomotive tires (smooth inside)	9.75 to 10.25
Pipes and flues	6.25 to 6.75
Malleable and steel scrap	7.25 to 7.75
Railroad tank and sheet scrap	5.25 to 5.75

Birmingham

BIRMINGHAM, ALA., May 11, 1914.

Pig Iron.—The market is still dull, with stocks said to be increasing even at the small furnace capacity in blast. The active capacity is below what it has been since June, 1912, when 16 stacks produced about the equivalent of this month's output. One interest, whose iron is usually in special demand, reports total sales of 500 tons for the first eight days of May and corresponding reports are made by others. Sales of several hundred tons of special analysis iron were effected at $11.75, but the regular run of sales for small lots in Southern territory brought $10.75 and $11. Most producers are still asking $11 for delivery after July 1 and quote $10.75 for spot, but no offer produces results beyond scattering sales for immediate demands of the consumers. The waiting attitude is more intense than

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	1.80 to 1.85
No. 12	1.90 to 1.95
Nos. 13 and 14	1.90 to 1.95
Nos. 15 and 16	2.05 to 2.10
Nos. 17 to 21	2.20 to 2.25
Nos. 22 and 24	2.35 to 2.40
Nos. 25 and 26	2.50 to 2.55
No. 27	2.65 to 2.70
No. 28	2.80 to 2.85
No. 29	2.95 to 3.00
No. 30	3.10 to 3.15

Pittsburgh

PITTSBURGH, PA., May 12, 1914.

Sentiment in the steel trade is little better. The feeling is pretty general that a buying movement, probably similar to the one that took place in January and February, may be expected some time in June. It is pointed out that new buying for three or four months has been light, and that jobbers and consumers will soon be forced to come into the market to replenish depleted stocks. Reliable information is that a decision in the freight rate case may be expected this month. Operations of the steel companies are steadily lessening and are not averaging over 60 per cent. New buying is from hand to mouth only. Prices on finished lines are weak, with not enough business coming out to test them seriously. Blue annealed and galvanized sheets are slightly lower, and prompt furnace coke has gone off about 10c. a ton. The scrap trade is still neglected.

Pig Iron.—It is understood that a Canton, Ohio, steel plant has closed for 15,000 tons of basic iron for third quarter delivery, the business having been taken by a Cleveland furnace interest. Nothing has been given out as to the price paid for this iron, but as Cleveland has a 75c. freight rate to Canton, it is figured that the iron did not bring above $12.75 at furnace, equal to $13.50 delivered, and possibly a lower price was made. There is no new inquiry in the local market, and prices on pig iron are purely nominal as follows: Bessemer, $14; basic, $13; No. 2 foundry, $13 to $13.50; gray forge, $12.75 to $13; malleable Bessemer, $13.25, for delivery through first half of this year, all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 90c. a ton.

Billets and Sheet Bars.—No new business is being offered in billets and sheet bars and prices are nominal. On a round tonnage of billets $20 could be shaded, and the same condition applies to sheet bars. Steel mills report specifications for bars from tin plate mills as fairly active, but from the sheet mills very dull. We quote Bessemer and open-hearth billets at $20, and Bessemer and open-hearth sheet bars at $21, f.o.b., makers' mills, Pittsburgh or Youngstown, for May and June delivery; forging billets, $25 on desirable specifications, embracing only one size, and up to but not including 10 x 10 in., the regular extras being charged for larger sizes. On small orders forging billets are held at $26. We quote axle billets at $23 for desirable orders and $24 for small orders.

Muck Bar.—We quote nominally at $27, delivered, for best grades made from all pig iron. Eastern muck bar is being offered in this market at a lower price.

Steel Rails.—It develops that the order for 12,000 tons of steel rails placed by the Erie Railroad with the Carnegie Steel Company was awarded several months ago, but the specifications did not reach the company until recently. Only small orders are being placed for standard sections, and it is not expected that large contracts will come out, except in a few cases, until after the freight rate decision is made. The new demand for light rails continues fairly active, the Carnegie Company having received new orders and specifications for about 2500 tons the past week. The general demand for track supplies is very quiet. We quote splice bars at 1.50c.; standard section Bessemer rails, 1.25c.; open-hearth standard sections, 1.34c., f.o.b. Pittsburgh. We quote light rails rolled from billets as follows: 25, 30, 35, 40 and 45 lb. sections, 1.10c.; 16 and 20 lb., 1.15c.; 12 and 14 lb., 1.20c., and 8 and 10 lb., 1.25c., in carload lots, f.o.b. Pittsburgh. For large lots, these prices might be slightly shaded.

Ferroalloys.—There is practically no new buying of either ferromanganese or ferrosilicon, as consumers are covered for some time ahead. An occasional carload of ferromanaganese is resold at $38, f.o.b. Baltimore. The price of English 80 per cent. ferromanganese has been $39, Baltimore, but it is understood one maker has quoted $38 in the past week. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71, delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is $19; 11 per cent., $20, and 12 per cent., $21, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Plates.—A very good line on the price situation in plates will probably be given when announcement is made of bids opened at Washington, D. C., on Tuesday for the two new Government boats, one of which is a transport and the other a supply ship. The transport will require about 4200 tons of plates and shapes and a few bars, and the supply ship about 3000 tons. No new orders for steel cars have been given out, and none is expected until the freight rate case is decided. It is known that railroads have requisitions piled up for cars and track supplies. Even if the 5 per cent. advance in freight rates is refused, considerable railroad buying is expected as soon as the decision is announced. The new demand for plates is dull, and as a rule mills are not running to more than 50 to 60 per cent. of capacity. The steel car companies have little work, one local interest not operating to more than 20 per cent. of capacity. We quote ¼-in. and heavier plates at 1.15c., Pittsburgh, but this price has been shaded in some cases. The Beaver Engineering & Contracting Company, New York City, is in the market for 3000 tons of ½ and 7/16-in. sheared steel plates for the building of a pipe line in Brooklyn, which is to be part of the Catskill aqueduct.

Skelp.—The new demand is dull, and none of the mills rolling skelp is running full, owing to lack of orders. We quote: Grooved steel skelp, 1.20c. to 1.25c.; sheared steel skelp, 1.25c. to 1.30c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., delivered to consumers' mills in the Pittsburgh district.

Structural Material.—No orders of moment were placed in this market last week. Work on the plans for the new William Penn Hotel in this city are being pushed, and bids on the steel are expected to be asked for within three or four weeks. This building will take about 6000 tons. Bids have gone in on the new Oliver avenue theater in this city, 1000 to 1200 tons. New inquiry is fair, but a good deal of complaint is being made by fabricators as to the low prices going, which, it is asserted, leave very little profit. Plans were sent out last week for the proposed Chesapeake & Ohio Railroad bridge over the Chio River at Portsmouth, and bids are to go in June 2. This job will require about 15,000 tons. We quote beams and channels up to 15-in. at 1.15c.

Wire Rods.—The market is very dull, new demand being quiet, and consumers are not specifying freely on contracts placed some time ago. A good many contracts for wire rods expire July 1, and some new buying is looked for in June. We quote Bessemer, open-hearth and chain rods at nominally $26, Pittsburgh. This price could be shaded on a good purchase.

Sheets.—No improvement is seen in the sheet trade. Prices on blue annealed and galvanized are lower. New buying is from hand to mouth, and specifications on contracts are slow. None of the mills is running to more than 50 to 60 per cent. of capacity. We quote Nos. 9 and 10 blue annealed sheets at 1.35c. to 1.40c.; No. 28 Bessemer black at 1.85c. to 1.90c.; No. 28 galvanized at 2.85c. to 2.90c.; No. 28 black plate, tin mill sizes, H. R. and A., 1.90c.; Nos. 29 and 30, 1.95c. These prices are for carload lots, f.o.b. Pittsburgh, jobbers charging the usual advances for small lots from store.

Tin Plate.—Mills are running to nearly 100 per cent. of capacity on contract specifications, but in the past

two or three weeks there has been a falling off in new specifications. The American Sheet & Tin Plate Company is operating this week to 94 per cent. of capacity, having six mills down at one plant on account of a broken engine, while its Demmler, Connellsville and Monongahela plants have not been operated for a long time. New orders are only fair and for small lots, and on these we quote 100-lb. 14 x 20 cokes at $3.30 to $3.40, and 100-lb. 14 x 20 ternes, $3.20 to $3.30 per base box, f.o.b. Pittsburgh.

Iron and Steel Bars.—Makers report that the demand for both iron and steel bars is quiet, and mostly for small lots to cover current needs. Specifications on steel bars from large consumers, such as the implement trade and wagon builders, are much lighter than usual for the season and in volume are far behind what was being done at this time last year. There are reports of steel bars having been sold in some special cases below 1.15c., makers' mills. Mills rolling iron bars are not running to more than 50 to 60 per cent. of capacity and have very little work ahead. We quote steel bars at 1.15c. and common iron bars at 1.30c., f.o.b. makers' mills, Pittsburgh. Regular extras for twisting reinforcing steel bars over the base price are as follows: ¾-in. and over, $1; ½ to 11/16-in., $1.50; under ½-in., $2.50 per net ton. These extras are not always observed.

Wire Products.—Several makers report that specifications against contracts placed at $1.55 for wire nails are coming in fairly well, but the new demand for wire and wire nails is quiet and only for small lots. Prices on wire and wire nails have been weak for some time, and on new orders $1.55 is being done on nails and $1.35 on plain annealed wire. We quote wire nails at $1.55 to $1.60; plain annealed wire, $1.35 to $1.40; galvanized barb wire and fence staples, $1.95 to $2; painted barb wire, $1.55 to $1.60, all per 100 lb., f.o.b. Pittsburgh, with actual freight added to point of delivery, terms being 30 days net less 2 per cent. off for cash in ten days. We quote cut nails at $1.65, f.o.b. Pittsburgh. Discounts on woven wire fencing are 73½ per cent. off in carload lots 72½ per cent. off on 1000-rod lots and 71½ per cent. on less than 1000-rod lots, all f.o.b. Pittsburgh.

Hoops and Bands.—The new demand for both hoops and bands is only for small lots. Consumers are covered on contracts to July 1 or longer, but specifications are only fair. Not enough business is coming out to test prices. We quote steel bands at 1.15c., with extras as per steel bar card, and steel hoops at 1.25c., f.o.b. Pittsburgh. It is stated that prices on both hoops and bands have been shaded $1 a ton.

Shafting.—Quiet conditions prevail, the new demand being only for small lots to cover current needs. It is said that two or three automobile builders are specifying for fairly large quantities of shafting, but from the others new business is very light. We quote cold-rolled shafting in carload lots at 65 to 66 per cent. off, and small lots 63 per cent. off, delivered in base territory.

Spikes.—One local maker of spikes has had its factory closed down last week and this week on account of the dull business conditions. Railroads are buying from hand to mouth, and no large inquiries are in the market. Specifications against contracts placed early in the year are dull. We quote standard sizes of railroad spikes at $1.40 and small railroad and boat spikes at $1.50, f.o.b. Pittsburgh.

Merchant Steel.—The new demand for seasonable steels is fair, but mostly in small lots to cover current needs, and specifications are unsatisfactory. Prices are weak, and on small lots are about as follows: Iron finished tire, ½ x 1½ in. and larger, 1.30c., base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Rivets, Nuts and Bolts.—Makers report that the new demand for nuts and bolts is only equal to 35 to 40 per cent. of capacity, and specifications against contracts are not coming in freely. The new demand for rivets is dull, as boiler and locomotive shops are running only part time. We quote button-head structural rivets at 1.60c. to 1.65c. and cone-head boiler rivets at 1.70c. to 1.75c., in carload lots, an advance of about $2 a ton over these prices being charged for small lots. Terms, 30 days net, less 2 per cent. for cash in 10 days. Discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of makers' works:

Coach and lag screws	80 and 5% off
Small carriage bolts, cut threads	80% off
Small carriage bolts, rolled threads	80 and 5% off
Large carriage bolts	75 and 5% off
Small machine bolts, cut threads	80 and 5% off
Small machine bolts, rolled threads	80 and 10% off
Large machine bolts	75 and 10% off
Machine bolts, c.p.c. & t nuts, small	80% off
Machine bolts, c.p.c. & t nuts, large	75 and 5% off
Square h.p. nuts, blanked and tapped	$6.30 off list
Hexagon nuts	$7.20 off list
C.p.c. and r sq. nuts, blanked and tapped	$6.00 off list
Hexagon nuts, ⅝ and larger	$7.20 off list
Hexagon nuts, smaller than ½ in.	$7.80 off list
C.P. plain square nuts	$5.50 off list
C.P. plain hexagon nuts	$5.90 off list
Semi-fin. hex. nuts, ½ in. and smaller,	85, 10 & 10% off
Semi-fin. hex. nuts, ⅝ in. and larger	85 & 5% off
Rivets, 7/16 x 6½, smaller & shorter	80, 10 & 5% off
Rivets, metallic tinned, bulk	80, 10 and 10% off
Rivets, tin plated, bulk	80, 10 and 10% off
Rivets, metallic tinned, packages	80, 10 and 5% off
Standard cap screws	70, 10 and 10% off
Standard set screws	75, 10 and 10% off

Standard Pipe.—Several leading makers of steel pipe report that indications favor a heavier demand in the near future. One leading interest recently made a careful canvass of the business outlook in the territory west of Chicago and reports it very favorable. At present pipe mills are running to about 50 to 60 per cent. of capacity. Discounts on iron and steel pipe are being well maintained.

Boiler Tubes.—A slightly better demand is reported for locomotive tubes, but new business in merchant tubes is light. The new discounts on steel tubes adopted May 1 are being only fairly well held.

Old Material.—The heavy steel scrap in the list of the Pennsylvania Lines West that closed last week went on the basis of about $12.25 per gross ton, delivered Steubenville, Ohio, and about the same price delivered Alliance, Ohio. At the latter place it was bought by a consumer and at Steubenville by a dealer. Consumers of scrap have been buying very little for some months, and for this reason dealers are looking for a better demand in the near future. Sales are reported of about 1300 tons of selected heavy steel melting scrap at $12.50, delivered, and 500 tons of wrought-iron turnings at $7.75, delivered. Dealers quote, per gross ton, for delivery to consumers' mills in the Pittsburgh and nearby districts that take the same rates of freight as follows:

Selected heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$12.00 to $12.25
Ordinary steel melting scrap	11.50 to 11.75
Compressed side and end sheet scrap	11.25 to 11.50
No. 1 foundry cast	11.50 to 11.75
No. 2 foundry cast	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.75 to 9.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.75 to 13.00
No. 1 railroad malleable stock	11.00 to 11.25
Railroad grate bars	10.25 to 10.50
Low phosphorus melting stock	14.50
Iron car axles	22.50 to 23.00
Steel car axles	15.50 to 16.00
Locomotive axles, steel	20.00 to 20.50
No. 1 busheling scrap	10.25 to 10.50
No. 2 busheling scrap	7.25 to 7.50
Machine shop turnings	7.75
Old carwheels	11.25 to 11.50
Cast-iron borings	7.75
†Sheet bar crop ends	12.00 to 12.25
Old iron rails	13.75 to 14.00
No. 1 railroad wrought scrap	11.50 to 11.75
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	12.00 to 12.25

†Shipping point.

Coke.—There is no new demand for prompt or future blast furnace coke. Prices on prompt coke are easier, it being freely offered at $1.75 per net ton at oven for standard grades. Some contracts for furnace coke expire July 1, but nothing has been done as yet in regard to renewing them. The new demand for foundry coke is dull, foundries as a rule not running to more than 50 per cent., and not taking in coke on their contracts very freely. Several large makers of standard quality blast furnace coke are still holding it at $2 at oven. A Cleveland furnace interest is reported to have bought 15,000 to 20,000 tons of standard coke for May delivery at $1.75 per net ton at oven. We quote strictly standard 72-hr. foundry coke at $2.40 to $2.50 at oven to consumers. The Connellsville Courier reports the output of coke in the upper and lower Connellsville regions last week as 305,610 net tons, a decrease over the previous week of 10,770 tons.

Boston

BOSTON, MASS., May 12, 1914.

Old Material.—The market changes very little. Sales are few. Little material is coming out. As for several weeks, nothing has occurred to give a real line on prices. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	$8.25 to $8.50
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.25 to 13.75
Old iron axles	21.25 to 21.75
Mixed shafting	12.00 to 12.25
No. 1 wrought and soft steel	9.00 to 9.25
Skeleton (bundled)	5.50 to 5.75
Wrought-iron pipe	7.50 to 7.75
Cotton ties (bundled)	6.00 to 6.25
No. 2 light	3.75 to 4.25
Wrought turnings	5.00 to 5.50
Cast borings	5.00 to 5.50
Machinery, cast	11.25 to 11.50
Malleable	8.00 to 8.25
Stove plate	7.75 to 8.00
Grate bars	5.25 to 5.50
Cast-iron carwheels	11.00 to 11.25

Chicago

CHICAGO, ILL., May 13, 1914.—(*By Wire.*)

A number of reports point to last week as the dullest since the first of the year with respect to tonnage. Prices also showed more marked softness than has previously appeared. In the face of this the undertone of sentiment sounds a note of renewed confidence. There are those who claim to have definite knowledge of orders to be placed in the second half of sufficient tonnage to start the tide of business on a rapidly ascending scale. Of actual developments the most significant are sales of ordinary tonnages of plates as low as 1.28c., Chicago, shapes at 1.30c., and bar iron at less than 1.10c. Sheets are no longer strong at 1.85c. and 2.85c., Pittsburgh. Fabricators figuring on the larger contracts are demanding protection on the plain material at prices at least as low as 1.10c., Pittsburgh, and in some cases 1.25c., Chicago. The placing of a small tonnage of rails and track accessories is noted, but it is the common experience of the mills in this district that shipments are steadily gaining on new bookings. Approximately 50 per cent. of open-hearth steel capacity is in operation, and the steel mills are already facing an excess production of pig iron. The blowing out of some blast-furnace capacity is imminent. No real interest has been developed in foundry pig iron, although some of the larger consumers are in a receptive mood for the consideration of last half purchases at a price.

Pig Iron.—Reports of quiet transactions, especially in basic iron, add another touch of interest in this market, to the recent sales for St. Louis delivery. To what extent the previous week's purchase by a St. Louis district steel foundry has contributed to these appearances of interest is not clear, but it is known that a market is being actively sought for the output of furnaces at Chicago, whose production is not now being absorbed as usual for steel-making purposes, and low prices are named in order to avoid blowing out. There is every reason to believe that these efforts have borne fruit. The situation is simply one in which the few buyers in a position where they can take in some iron are being influenced to do so by the incentive of bargain prices for a limited tonnage. For other reports of sales of malleable and foundry iron no tangible verification has been found. On small lots of iron there is some shading of prices for which a warrant is found in the analysis specifications. For the average consumer the market presents no change. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal	$15.75 to $16.75
Northern coke foundry, No. 1	14.75 to 15.00
Northern coke foundry, No. 2	14.00 to 14.50
Northern coke foundry, No. 3	13.75 to 14.00
Southern coke, No. 1 f'dry and 1 soft	15.35 to 15.85
Southern coke, No. 2 f'dry and 2 soft	14.85 to 15.35
Southern coke, No. 3	14.35 to 14.85
Southern coke, No. 4	13.85 to 14.35
Southern gray forge	13.35 to 13.85
Southern mottled	13.10 to 13.35
Malleable Bessemer	14.00 to 14.50
Standard Bessemer	17.00
Basic	13.25 to 13.50
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. sil'vy, 10 per cent.	18.90 to 19.40

(*By Mail*)

Rails and Track Supplies.—Among the rail business of the week an order for 1800 tons for a local road is reported. The sale of 600 tons of girder rails is also noted. These items represent the best that may be said of the situation. Other business included miscellaneous orders for tie plates, spikes and bolts of sufficiently larger tonnage than has ruled for the past few weeks to be worthy of comment. It is interesting to note that this is the first year in a very long period in which the Baltimore & Ohio Railroad has failed to place any rail orders during the first half. Some of the hope for better business in the second half is based on this and similar facts. We quote standard railroad spikes at 1.50c. to 1.55c., base; track bolts with square nuts, 2c. to 2.10c., base, all in carload lots, Chicago; tie plates, $26 to $28 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—The Warner Construction Company has been awarded the general contract for the municipal pier at Chicago and common report names the Morava Construction Company as the probable fabricator of the steel. The only other contract of importance announced during the week was 1126 tons for the Borland Building addition, awarded to Hansell-Elcock Company. Other contracts include 297 tons, Paulina Street wharf shed, New Orleans, to the Modern Steel Structural Company; 308 tons, Louisville Gas & Electric Company, to Grainger & Co., Louisville; 107 tons, American Smelting & Refining Company, Leadville, Col., to the Kansas City Structural Steel Company; 183 tons, Highland Park high school, to A. Bolters' Sons; 200 tons, Berkeley postoffice, to the Pacific Rolling Mill Company; 200 tons, A. O. Stewart Hotel, San Francisco, to the Central Iron Works; 186 tons, State & Harrison Building, Chicago, to the Gage Structural Steel Company; 260 tons, Northwestern Trust Company building, Grand Forks, Minn., to the St. Paul Foundry Company. The letting of a contract for the Second Regiment Armory, Chicago, about 900 tons, has been postponed to May 15. Car orders of the week include 1000 from the Southern Railway and 500 from the Denver & Rie Grande, all placed with the American Car & Foundry Company. For ordinary tonnage and specifications 1.15c., Pittsburgh, is still the market price but for desirable business we quote for Chicago delivery mill shipment 1.28c. to 1.33c.

For Chicago delivery of structural shapes from jobbers stocks we continue to quote 1.75c.

Plates.—Carload business in plates is being taken by the mills at 1.33c., Chicago, and more desirable business commands prices in some instances a full dollar a ton below that quotation. The demand is light and without feature. We quote for Chicago delivery from mill 1.25c. to 1.33c.

We quote from store for Chicago delivery of plates 1.75c.

Sheets.—Specifications are steadily falling behind shipments and mill bookings are gradually growing thinner. Sheet mills with any freight advantage to concede are no longer holding to the Pittsburgh basis of 1.85c. for No. 28 black and 2.85c. for galvanized, particularly as regards the latter. Despite the very low level of prices there seems to be little interest on the part of users with respect to contracts. A disposition to let the situation run its course until some tangible indication as to the future appears is generally prevalent. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.53c.; No. 28 black, 2.03c. to 2.08c.; No. 28 galvanized, 3.03c. to 3.08c.

For sheets out of store we quote for Chicago delivery as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.45c. to 2.55c.; No. 28 galvanized, 3.50c. to 3.60c.

Bars.—Implement manufacturers are not committing themselves in connection with contracts for next year and are apparently waiting for the mills to make the first move, although the usual season for contracting is now well advanced. New transactions in steel bars are too few to bring the matter of price into much prominence. While the same situation holds good with bar iron as far as tonnage is concerned prices for this commodity have been forced down to one of the very low points in recent years. The market is very weak at 1.10c. and concessions of a dollar a ton below that price seem to prove no great incentive to bar-iron users. We quote for mill shipments as follows: Bar Iron, 1.10c. to 1.15c.; soft steel bars, 1.33c.; hard steel bars, 1.30c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off.

Rivets and Bolts.—Manufacturers of rivets and bolts are securing just enough business to warrant the operation of their plants, but much too small a volume to make operation profitable or attractive. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-5; cut thread, 80; larger sizes, 75-5; machine bolts up to ⅜ x 4 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-10; coach screws, 80-15; hot pressed nuts, square head, $6.20 off per cwt.; hexagon, $7 off per cwt. Structural rivets, ½ to 1¼ in., 1.73c. to 1.78c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2.35c.; boiler rivets, 2.55c.; machine bolts up to ¾ x 4 in., 75-10; larger sizes, 70-10-5; carriage bolts up to ¾ x 6 in., 75-5; larger sizes, 70-10 off; hot pressed nuts, square head, $6, and hexagon, $6.70 off per cwt.

Wire Products.—For some of the independent mills the wire trade continues to present very substantial aspects. Numerous instances are reported of inability to meet consumers' demands in the matter of deliveries, particularly with respect to plain wire for further manufacture. Wire fencing also holds up well, especially garden and poultry styles. Wire nail sales still lack their normal volume, and barb wire is but slightly better. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.58; wire nails, $1.78; painted barb wire, $1.78; galvanized, $2.18; polished staples, $1.78; galvanized, $2.13, all Chicago.

Old Material.—Buying of scrap in this market is again reduced to a minimum and prices are weaker for all of the principal items. Transactions are limited to the trading that is necessary to move the tonnage disposed of by the railroads to the dealers and brokers. Railroad offerings for the week include a list from the Santa Fé, 2700 tons from the Chicago, Milwaukee & St. Paul, 1500 tons from the Grand Trunk and 1400 tons from the Chicago, St. Paul, Minneapolis & Omaha. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Old iron rails	$12.75 to	$13.25
Old steel rails, rerolling	11.25 to	11.75
Old steel rails, less than 3 ft.	10.50 to	11.00
Relaying rails, standard section, subject to inspection		24.00
Old carwheels	11.50 to	11.75
Heavy melting steel scrap	9.75 to	10.25
Frogs, switches and guards, cut apart	9.75 to	10.25
Shoveling steel	9.00 to	9.50
Steel axle turnings	6.75 to	7.25

	Per Net Ton	
Iron angles and splice bars	$12.00 to	$12.50
Iron arch bars and transoms	12.00 to	12.50
Steel angle bars	9.00 to	9.50
Iron car axles	17.25 to	17.75
Steel car axles	12.25 to	12.75
No. 1 railroad wrought	9.00 to	9.50
No. 2 railroad wrought	8.50 to	8.75
Cut forge	8.50 to	8.75
Steel knuckles and couplers	9.00 to	9.50
Steel springs	9.50 to	10.00
Locomotive tires, smooth	9.75 to	10.00
Machine shop turnings	5.00 to	5.50
Cast borings	4.50 to	5.00
No. 1 busheling	7.50 to	8.00
No. 2 busheling	6.00 to	6.50
No. 1 boilers, cut to sheets and rings	6.50 to	7.00
Boiler punchings	9.25 to	9.75
No. 1 cast scrap	10.00 to	10.25
Stove plate and light cast scrap	9.00 to	9.50
Grate bars	8.75 to	9.25
Railroad malleable	9.25 to	9.75
Agricultural malleable	8.00 to	8.50
Pipes and flues	6.75 to	7.25

Hoops and Bands.—The present desultory trade is lacking in features deserving comment. We quote for Chicago delivery of bands, 1.33c. to 1.38c., and for hoops 1.43c. to 1.48c.

Philadelphia

PHILADELPHIA, PA., May 12, 1914.

No betterment in buying and no greater interest on the part of consumers can be discerned in this drifting market. One aspect of the situation which in some ways may be construed as a good one, in view of present low prices, is that merchants and consumers are laying in no stock. If history repeats itself, as it almost surely will, there will be a clamor for quick deliveries when demand starts upward, carrying with it prices inasmuch as these must be averaged to show a reasonable return, and there will be much disappointment on the part of those who have not the material in stock or under contract with which to do business and who cannot get it promptly. Dull as the situation is, it is felt that prices of most materials and products will sag no further as they are already too near the danger line. There are two or three exceptions, including pig iron, to a limited extent, and cast-iron pipe. Prices of the latter are irregular and the cutting has been severe. Unprofitable as pig iron has been of late, there has developed a tendency on the part of some sellers to make an additional sacrifice of a few points to capture the current small lot business. In billets, bars, plates and shapes there is little new to report. Old materials are quiet, with practically no price change.

Iron Ore.—There is no new business and not likely to be, pending improvement in present conditions. The ultimate effect of the reduction in Lake ore prices, which was no more than had been expected, may cause a reduction in prices of some Eastern and foreign ores used in this territory. Importations in the week ended May 9 were 10,550 tons from Cuba and 18,422 tons from Sweden.

Pig Iron.—Buying has been even lighter than in recent dull weeks and unprofitable as pig iron production has been, the market is weaker. There has been cutting in various instances to secure some of the few small orders which were to be had. Few transactions involve above 100 tons and the amount is more often less. The average price for eastern Pennsylvania No. 2 X is $15, though some sellers ask $15.25. At these quotations business has been lost, as there are those who

will accept as low as $14.80, while some grades of No. 2 X are quoted at $14.75. The pipe foundries are taking little or no iron. With them business is slow and prices are being cut severely and openly. A prominent dealer in basic asserts that he knows of not a single inquiry, while others say there has been some talk with regard to purchasing steel-making iron, but it has not resulted in sales. A peculiarity of the situation is that some consumers who ordinarily buy from 1000 to 2000 tons at a time now content themselves with taking 100 or 200 tons, this being true of at least one having a good bit of work on hand. Virginia iron has been more quiet than Northern. The following range of prices represents the general market for near delivery in buyers' yards in this district:

Eastern Penna. No. 2 X foundry	$14.75 to $15.25
Eastern Penna. No. 2 plain	14.50 to 14.75
Virginia No. 2 X foundry	15.55 to 15.75
Virginia No. 2 plain	15.30 to 15.55
Gray forge	13.75 to 14.00
Basic	14.00
Standard low phosphorus	21.00

Ferroalloys.—Occasional sales of carload lots of 80 per cent. ferromanganese constitute the only transactions. Quotations are now $38, seaboard, for English or German. Quotations for 50 per cent. ferrosilicon range from $71 to $73, Pittsburgh, according to quantity. Offerings of foreign ferrosilicon have ceased since the sellers were warned that they were liable for infringement of patent.

Billets.—Specifications are only fair at best and do not insure activity far ahead. Prices continue weak at $22.40 to $23.40 for open-hearth rolling billets, with forging steel at the customary advance of $4 to $5 per ton, according to specifications.

Structural Material.—The Delaware, Lackawanna & Western Coal Company has placed with the Guerber Engineering Company a contract for the coal breaker to be erected near Wilkes-Barre, which will take about 1000 tons. It is understood that the same company has in contemplation another and similar breaker. The North Philadelphia bridge of the Pennsylvania Railroad, 250 tons, heretofore referred to, is understood to have gone to the Riter-Conley Mfg. Company. The city of Philadelphia is in the market for a bridge over Darby creek, requiring about 150 tons. Tangible items of importance are few and the market anything but satisfactory. For highly desirable business the quotation is 1.25c., Philadelphia, with the common run of business at 1.30c. and jobbing lots at 1.35c.

Bars.—Iron bars show no increased demand, with prices unchanged at 1.20c. to 1.25c., delivered here. For concrete reinforcing bars merchants report a little better demand. Quotations range from 1.25c. to 1.30c., Philadelphia, the lower price obtainable for large lots only.

Old Material.—Dullness continues, with prices well held. No betterment is expected until the demand for finished products picks up. The following quotations about represent the market for deliveries in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates varying from 35c. to $1.35 per gross ton:

No. 1 heavy melting steel	$10.50 to $11.00
Old steel rails, rerolling	12.25 to 12.75
Low phosphorus heavy melting steel scrap	14.50 to 15.00
Old steel axles	14.00 to 14.50
Old iron axles (nominal)	20.00 to 21.00
Old iron rails (nominal)	15.50 to 16.00
Old carwheels	11.75 to 12.25
No. 1 railroad wrought	12.50 to 13.00
Wrought-iron pipe	10.00 to 10.50
No. 1 forge fire	8.00 to 8.50
Bundled sheets	8.00 to 8.50
No. 2 light iron	5.00 to 5.50
No. 2 busheling	8.00 to 8.50
Wrought turnings	7.50 to 8.00
Cast borings	8.00 to 8.50
No. 1 cast	12.50 to 13.00
Grate bars, railroad	8.50 to 9.00
Stove plate	8.75 to 9.25
Railroad malleable	9.00 to 9.50

Coke.—Standard Connellsville furnace coke, or its equivalent, continues firm, but quiet, at $2 per net ton at oven for contract, with prompt at $1.85 to $1.90. In foundry coke not much interest is shown, although a great many contracts expire June 30. Prompt foundry can be had at $2.35 to $2.50 per net ton at oven, while the nominal price of contract coke is about $2.50, with choice grades running higher. Freight rates to this city from the producing districts are as follows: Connellsville, $2.05; Mountain, $1.65; Latrobe, $1.85.

Plates.—The building of two Government boats, bids on which have been submitted, promises the requirement of about 6000 tons of plates and 2000 tons of shapes. The Harlan & Hollingsworth Corporation has secured a contract for the building of a 300-ft. steamer for the Pacific coast. Current orders have continued to be of the small, miscellaneous character so prevalent of late. The lack of demand from the railroads is keenly felt. On sufficiently attractive business 1.25c. Philadelphia can be done, smaller lots commanding 1.30c.

Sheets.—Where the quantity is sufficiently large to be an inducement, makers will sell No. 10 blue annealed sheets at 1.50c., Philadelphia, with less desirable lots still calling for 1.55c.

Cleveland

CLEVELAND, OHIO, May 12, 1914.

Iron Ore.—The ore market is exceedingly dull, very little buying, as was expected, having followed the establishment of season's prices. Furnacemen expect to have no trouble whatever this season in securing the ores that they want and will take their time about buying. While most of the leading ore firms are adhering to the new prices, there are already reports of some shading of base prices. However, it appears that price shading so far has been limited to low grade ores. Ore carrying charges have practically been fixed at the 1912 rate, which is a reduction of 5c. a ton from the 1913 rate or 40c. from the head of the lakes. So far there has been very little chartering of outside tonnage for the ore trade. We quote prices as follows: Old range Bessemer, $3.75; Messaba Bessemer, $3.50; old range non-Bessemer, $3; Messaba non-Bessemer, $2.85.

Pig Iron.—A northern Ohio steel company has bought 15,000 tons of basic iron for the third quarter delivery on the inquiry noted last week. While information as to the price paid is withheld, it is believed that the business was placed on the basis of about $13, Valley furnace. There is little demand for Northern foundry iron, the only sales reported being small lots for delivery before July 1. Several Southern producers have opened their books for last half contracts at the current price of $10.50, Birmingham, for No. 2, and some business is being placed for that delivery. We note the sale of 450 tons of No. 2 Southern to a Cleveland consumer for the last half and a local inquiry for 400 tons of No. 1 for the same delivery. A northern Ohio stove plant is in the market for 750 tons of Southern iron for delivery in seven months, beginning June 1. Prices are unchanged. We quote, delivered Cleveland, as follows:

Bessemer	$14.90
Basic	13.90
Northern No. 2 foundry	14.25
Southern No. 2 foundry	14.85
Gray forge	13.50
Jackson Co. silvery, 8 per cent. silicon	17.55
Standard low phosphorus, Valley furnace	20.50

Coke.—Spot furnace coke is weaker, being quoted at $1.85 per net ton at oven, and this price can probably be shaded 5c. There is an increasing surplus of foundry coke as foundries are not taking shipments and new demand is lacking. We quote standard 72-hr. foundry coke at $2.40 to $2.65.

Finished Iron and Steel.—Sentiment shows an improvement and some sellers report a slightly better volume of current orders. Some of the implement manufacturers are inquiring for steel bar prices for the coming year, but sellers generally are trying to avoid making quotations at the present time. In some cases quotations higher than the prevailing 1.15c. price have been made for delivery to January 1 with no expectation of closing contracts at the prices quoted. New demand for steel bars is light and there is practically no demand for iron bars. Steel bars, structural material and plates are quoted at 1.15c., Pittsburgh, for carloads, but some of

the smaller mills are shading plates $1 a ton. We quote iron bars at 1.20c., Cleveland. Structural material is in light demand. The Burger Iron Company, Akron, has taken 700 tons for additions to the plant of the Firestone Tire & Rubber Company. The Cleveland Railway Company will shortly place contracts for several new buildings that will require about 1500 tons. The Marion Steam Shovel Company will require about 350 tons for a crane runway. The demand for sheets is not active and there are rumors that the regular quotations of 1.85c. for No. 28 black and 2.85c. for No. 28 galvanized are being shaded. We quote warehouse prices at 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts and Rivets.—Bolts and nuts are in light demand, buying being only in small lots for immediate delivery. Rivet prices are unchanged at 1.55c. for structural and 1.65c. for boiler rivets for round lots. We quote discounts as follows: Common carriage bolts, ⅜ x 6 in. smaller or shorter, rolled thread, 80 and 5 per cent.; cut thread, 80 per cent.; larger or longer, 75 and 5 per cent.; machine bolts with h.p. nuts, ⅜ x 4 in., smaller or shorter, rolled thread, 80 and 10 per cent.; cut thread, 80 and 5 per cent.; larger or longer 75 and 10 per cent.; coach and lag screws, 80 and 15 per cent.; square h.p. nuts, blank or tapped, $6.30 off; hexagon h.p. nuts, blank or tapped, $7.20 off; c. p. c. and t. square nuts, blank or tapped, $6 off; hexagon, ⅝ in. and larger, $7.20 off; 9-16 in. and smaller, $7.80 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10 and 5 per cent.; 9-16 in. and smaller, 85, 10, 10 and 5 per cent.

Old Material.—The local market continues very dull. Valley mills are buying a limited amount of scrap and are offering $11.75 for heavy melting steel, although some has brought a slightly higher price. We note the sale of about 1000 tons of steel knuckles and couplers to a Valley consumer. Cleveland mills are entirely out of the market and are taking little material on contract. Prices are weak, but quotations are unchanged. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails, rerolling	$11.50 to $12.00
Old iron rails	13.50 to 14.00
Steel car axles	15.00 to 15.25
Heavy melting steel	10.25 to 10.75
Old carwheels	11.50 to 12.00
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	8.50 to 9.00
Railroad malleable	10.75 to 11.00
Light bundled sheet scrap	7.50 to 8.00

Per Net Ton

Iron car axles	$17.25 to $18.25
Cast borings	5.75 to 6.25
Iron and steel turnings and drillings	5.25 to 5.50
Steel axle turnings	6.75 to 7.25
No. 1 busheling, new	8.50 to 8.75
No. 1 busheling, old	8.00 to 8.25
No. 1 railroad wrought	9.50 to 10.00
No. 1 cast	10.50 to 10.75
Steve plate	7.50 to 8.00

Cincinnati

CINCINNATI, OHIO, May 13, 1914.—(*By Wire.*)

Pig Iron.—There are practically no encouraging features to report. The foundry melt has been gradually declining in this vicinity. The consumption of basic iron is more nearly normal. Southern prices are soft but nothing below $10.50, Birmingham basis, has been done for nearby shipment. Well authenticated reports are circulated that strictly last half contracts would probably be acceptable at the same figure. The lower foundry grades are now generally quoted with only 25c. a ton differential and a few carload sales have been made on this basis. Northern iron is held at $13.50, Ironton, and it is reported that preparations are being made to reduce the output in the Hanging Rock district. Numerous requests to hold up shipments on contracts tend to give the situation a somewhat pessimistic turn but both sellers and buyers are practically agreed that prices have about struck bottom. The delayed shipments on old contracts will tend to hold up contracting for last half requirements, as many foundries have enough iron to carry them through the third quarter. A few small lots of Ohio high silicon iron have been sold, augmenting the comparatively large sales recently reported. The very slow demand for malleable is attributed to the absence of railroad buying. The agricultural implement manufacturers are also holding back in signing up for future wants. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$14.25 to $14.75
Southern coke, No. 2 f'dry and 2 soft.	13.75 to 14.25
Southern coke, No. 3 foundry	13.25 to 13.75
Southern No. 4 foundry	12.75 to 13.25
Southern gray forge	12.25 to 12.75
Ohio silvery, 8 per cent. silicon	17.20 to 17.70
Southern Ohio coke, No. 1	15.70 to 16.20
Southern Ohio coke, No. 2	14.70 to 15.20
Southern Ohio coke, No. 3	14.45 to 14.70
Southern Ohio malleable Bessemer	14.70 to 15.20
Basic, Northern	14.70 to 15.20
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(*By Mail*)

Coke.—Although the foundries usually contract for a future supply about this time, no interest is taken in the situation. The majority have enough due on contracts to keep running for some time, at their present rate of consumption. Only a few carloads are being moved on new orders, although there is not much complaint about shipments held up on old contracts. Connellsville and Wise County 72-hr. coke is quoted around $2.50 to $2.75 per net ton at oven, but it is stated that 15c. a ton lower can be done on a few Pocohontas brands. Furnace coke is about the same in all three districts, ranging from $1.80 to $2 at oven, and there is no contracting to be reported.

Finished Material.—The local demand is very light. The uncertainty as to the labor situation is holding back much work that would require structural material. Mill agencies here also report a dearth of orders from the railroads for track material. Sheets are quiet, but there is a slightly better inquiry. Store prices on steel bars remain at 1.75c., and on structural shapes 1.85c. Based on No. 28, we quote black sheets at 2c. to 2.05c., and galvanized at 3c. to 3.05c., f.o.b. cars Cincinnati, or Newport, Ky.

Old Material.—The larger users of scrap are said to be holding up shipments on contracts, while the smaller consumers are only using about 50 per cent. of the usual tonnage. There is a considerable amount of scrap iron on the market, and, as a consequence, prices are weak and have receded an average of about 25c. a ton on all grades. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$6.75 to $7.25
Old iron rails	11.75 to 12.25
Relaying rails, 50 lb. and up	19.75 to 20.25
Rerolling steel rails	10.75 to 11.25
Melting steel rails	9.25 to 9.75
Old carwheels	10.25 to 10.75

Per Net Ton

No. 1 railroad wrought	$8.75 to $9.25
Cast borings	4.50 to 5.00
Steel turnings	4.50 to 5.25
Railroad cast scrap	9.25 to 9.75
No. 1 machinery cast scrap	10.25 to 11.25
Burnt scrap	6.00 to 6.75
Old iron axles	16.75 to 17.25
Locomotive tires (smooth inside)	9.75 to 10.25
Pipes and flues	6.25 to 6.75
Malleable and steel scrap	7.25 to 7.75
Railroad tank and sheet scrap	5.25 to 5.75

Birmingham

BIRMINGHAM, ALA., May 11, 1914.

Pig Iron.—The market is still dull, with stocks said to be increasing even at the small furnace capacity in blast. The active capacity is below what it has been since June, 1912, when 16 stacks produced about the equivalent of this month's output. One interest, whose iron is usually in special demand, reports total sales of 500 tons for the first eight days of May and corresponding reports are made by others. Sales of several hundred tons of special analysis iron were effected at $11.75, but the regular run of sales for small lots in Southern territory brought $10.75 and $11. Most producers are still asking $11 for delivery after July 1 and quote $10.75 for spot, but no offer produces results beyond scattering sales for immediate demands of the consumers. The waiting attitude is more intense than

ever. Criticism of the new tariff is being sidetracked for the time being by attention to Southern territory in the growing conviction that it must take care of Southern iron hereafter. Operators are inclined to believe that a new basis for Southern business is establishing itself along the lines laid down by Judge Gary, of the United States Steel Corporation, who said the natural trade territory of Southern iron and steel mills was the South, the Southwest and export. Foundries report no increase in output, and there is no indication of early revival in any consuming quarters. We quote, per gross ton, f.o.b. Birmingham furnaces, as follows:

No. 1 foundry and soft	$11.00 to $11.50
No. 2 foundry and soft	10.50 to 11.00
No. 3 foundry	10.00 to 10.50
No. 4 foundry	9.75 to 10.25
Gray forge	9.50 to 10.00
Basic	10.25 to 10.75
Charcoal	23.25 to 23.75

Cast-Iron Pipe.—Large pipe shops are reported as on a 75 per cent. gait, with sufficient small orders in conjunction with the few large ones to keep down stock accumulation. Sanitary pipe plants are working satisfactorily. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $20.50; 6-in. and upward, $18.50, with $1 added for gas pipe.

Coal and Coke.—Some coke business has been secured for Pensacola and some more Western orders have been received. We quote per net ton, f.o.b. oven, as follows: Furnace coke, $2.60 to $2.90; foundry, $3 to $3.40. Coal has not improved, but it holds its own at a pace slightly better than that of some time past, with additional domestic mines filling up their yards.

Old Material.—The deals are small, light cast and stove plate predominating. Some steel grades moved during the week, but generally the market is inactive. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$14.50 to $15.00
Old steel axles	14.50 to 15.00
Old iron rails	13.00 to 13.50
No. 1 railroad wrought	10.00 to 11.00
No. 2 railroad wrought	8.50 to 9.00
No. 1 country wrought	9.00 to 10.00
No. 2 country wrought	8.00 to 9.00
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	9.50 to 10.00
Standard carwheels	10.50 to 11.00
Stove plate	8.00 to 8.50

Buffalo

BUFFALO, N. Y., May 12, 1914.

Pig Iron.—Increase in inquiry is becoming more general for all grades, and the total of inquiry received by Buffalo furnaces covers about 7000 tons. Orders are also more numerous, although individually small. No. 3 Susquehanna furnace of the Rogers-Brown Iron Company went out of blast Friday, May 8. We quote as follows, for first half delivery, f.o.b. Buffalo, with 25c. per ton added for Buffalo, city delivery:

No. 1 foundry	$14.00 to $14.25
No. 2 X foundry	13.50 to 14.00
No. 2 plain	13.25 to 13.75
No. 3 foundry	13.00 to 13.25
Gray forge	13.00
Malleable	13.75 to 14.25
Basic	13.75 to 14.25
Charcoal, regular brands and analysis	15.75 to 16.75
Charcoal, special brands and analysis	20.50

Finished Iron and Steel.—The market for bars, plates and shapes is now pretty well established at 1.15c., Pittsburgh, base, for all desirable business and for immediate shipment, or at mills' convenience. No contracts for future delivery are being made at this price. Considerable improvement is noted in the volume of inquiry, due largely to building operations. In plates little business is moving. Sheets are in good demand, but at prices a trifle under recent quotations and local sheet mills are running full. Bids are in for 300 tons of structural steel and a quantity of reinforcing bars for the Santol Rubber Company at Niagara Falls, N. Y., and bids are to go in soon for alterations of the Seneca street viaduct, Buffalo, 300 tons. Cramp & Co. have 200 tons for the Palace Theatre and 300 tons for the Grant Street Theatre, Buffalo. Bids are now being taken for a leather manufacturing building at Gloversville, N. Y., for about 250 tons, for G. Levor & Company, Wm. Steele & Sons Company, Philadelphia, architects.

Old Material.—The market continues dormant and unsettled. Mills and foundries are not anxious to buy, owing to curtailed production, and dealers are unwilling to sell except in limited lots at current prices, consequently only small business is moving in any line. Prices are unchanged from last week. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$10.00 to $10.50
Low phosphorus steel	14.50 to 15.00
Boiler plate sheared	11.50 to 12.00
No. 1 railroad wrought scrap	11.00 to 11.50
No. 1 railroad and machinery cast	11.50 to 12.00
Old steel axles	12.75 to 13.25
Old iron axles	21.50 to 22.00
Old carwheels	11.50 to 12.00
Railroad malleable	10.25 to 10.75
Machine shop turnings	5.25 to 5.75
Heavy axle turnings	7.50 to 8.25
Clean cast borings	6.00 to 6.50
Old iron rails	15.00 to 15.50
Locomotive grate bars	9.50 to 10.00
Stove plate (net tons)	9.75 to 10.00
Wrought pipe	7.50 to 8.00
Bundled sheet scrap	6.25 to 6.50
No. 1 busheling scrap	8.25 to 8.75
No. 2 busheling scrap	5.75 to 6.25
Bundled tin scrap	10.50

St. Louis

ST. LOUIS, MO., May 11, 1914.

Pig Iron.—Purchases, aside from 5000 tons of Northern basic which added to 15,000 tons previously reported makes total of 20,000 tons contracted for in the past 10 days, have been of the widest possible range as to analysis and source. The transactions have ranged from carload lots upward. The aggregate for the week in this territory will probably run 5000 tons in such lots. Furnace representatives report a reasonably satisfactory condition of yards and that purchasers are continuing to take their allotments without hesitancy.

Coke.—The Great Western Sugar Company's usual purchase is still being held up, the uncertainty of the labor situation in Colorado being reported as having much to do with the delay. About 50,000 tons are involved and oven representatives are somewhat anxious for a decision. By-product coke is moving on about the Connellsville basis.

Finished Iron and Steel.—Fabricators are keeping at work, but between stocks on hand and quick shipment possibilities are having no difficulty in getting material as needed. Light rails are again unfavorably affected by the difficulties in the mining districts, while standard rails show no life beyond the 1000 and 2000 tons inquiries recently reported but not yet closed.

Old Material.—The railroad companies continue to force out large quantities of old material and, apparently in need of money, are letting it go at prices offered. Lists out are 6500 tons from Southern, 1000 from the Missouri, Kansas & Texas and 500 from the Vandalia. A local industry has also offered 1400 tons. We quote dealers' prices, f.o.b. St. Louis, as follows, with the reservation that dealers are actually paying only such prices as they can develop from sellers needing cash:

Per Gross Ton

Old iron rails	$10.50 to $11.00
Old steel rails, rerolling	10.50 to 11.00
Old steel rails, less than 3 feet	10.25 to 10.75
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	10.50 to 11.00
No. 1 railroad heavy melting steel scrap	9.75 to 10.25
Shoveling steel	8.00 to 8.50
Frogs, switches and guards cut apart	9.75 to 10.25
Bundled sheet scrap	4.50 to 5.00

Per Net Ton

Iron angle bars	$10.00 to $10.50
Steel angle bars	8.25 to 8.75
Iron car axles	16.75 to 17.25
Steel car axles	11.75 to 12.25
Wrought arch bars and transoms	11.25 to 11.75
No. 1 railroad wrought	8.00 to 8.50
No. 2 railroad wrought	7.50 to 8.00
Railroad springs	8.50 to 9.00
Steel couplers and knuckles	8.50 to 9.00
Locomotive tires, 42 in. and over, smooth	9.00 to 9.50
No. 1 dealers' forge	7.25 to 7.75
Mixed borings	3.25 to 3.75
No. 1 busheling	7.00 to 7.50
No. 1 boilers, cut to sheets and rings	5.25 to 5.75
No. 1 cast scrap	9.00 to 9.50
Stove plate and light cast scrap	7.50 to 8.00
Railroad malleable	7.25 to 7.75
Agricultural malleable	6.75 to 7.25
Pipes and flues	5.25 to 5.75
Railroad sheet and tank scrap	5.25 to 5.75
Railroad grate bars	6.75 to 7.25
Machine shop turnings	4.25 to 4.75

New York

NEW YORK, May 13, 1914.

Pig Iron.—More inquiry for pig iron has come out in the past week but on no such scale as really to stir the market, so confirmed has it become in stagnation. A well-known producer of railroad castings has inquired for 1500 tons for delivery at its Central and Western plants, none of the iron being for its Eastern operations. Some charcoal iron is included and some coke foundry grades for shipment to a plant making malleable castings for the most part. The 3000-ton inquiry in New Jersey recently mentioned is still open. A number of 200-ton to 300-ton sales are reported, the average for May thus far being rather above that of April in most selling offices. One or two furnaces will probably be blown out, but in the East the consumption and production have kept close together. At Buffalo one furnace has blown out since the beginning of the month, following an accident. There is little interest in basic iron in the East, though a sale of basic is reported by a Buffalo interest. Prices are weaker in spite of the extremely low levels that have been reached, and it is admitted that any particular increase in activity would be at the expense of the prices recently asked for forward delivery. Nothing better comes out as to the scale of foundry operations, the current melt in the East probably being 50 to 60 per cent. of capacity. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $15 to $15.25; No. 2 X, $14.75 to $15; No. 2 plain, $14.50 to $14.75; Southern iron, $15 to $15.50 for No. 1 and $14.75 to $15 for No. 2.

Finished Iron and Steel.—Considerable encouragement is taken from a steady flow of orders from an increasing number of buyers, though the total is not large. Prices are fairly well held, and business large enough to go at 1.10c., Pittsburgh basis, is not much talked of. No car purchases are reported for the week, but the Delaware, Lackawanna & Western has definitely entered the market for 500 hopper cars and 200 automobile cars. The structural steel market is buoyed by some sizeable contract lettings, as the subjoined list will show, and by the report of the bridge builders' society that in April 88 per cent. of the capacity of the bridge and structural shops of the country was under contract. Eastern plate mills are selling generally at 1.15c., Pittsburgh, for large lots and 1.20c. for small lots, but some of the Eastern structural mills have named 1.15c. in less than carload lots, and prices are shaded to 1.12½c. and 1.10c. only in special competitive cases. Further indications were obtained that European mills are regarding the possibility of business with America as ultimately of some promise; in New York there have been established what are essentially branch offices of two of the notably large German steel mills, although to date the volume of business placed with them is of no moment. In addition a German pipe works has made a quotation on boiler tubes below the prevailing rates here. On the other hand, low prices continue to be made on export business and one case is noted of 300 tons of plates sold by a Western mill at a price figuring back to 1.05c., Pittsburgh, if domestic freight rates are considered. Among the awards involving principally shapes and plates may be mentioned: 1900 tons for the New York Central, of which 200 tons was taken by Lewis F. Shoemaker & Co., though it is a commentary on present conditions to note that 550 tons of other New York Central work has been perhaps temporarily abandoned; 800 tons for a bank at Bridgeport, Conn., to Levering & Garrigues Company; 3400 tons for the New York subway system, awarded to the American Bridge Company about two weeks ago but not here mentioned; 1200 tons for the Boston & Albany, awarded to a number of bridge builders, including the American Bridge Company and Lewis F. Shoemaker & Co.; 400 tons for the Oxford Paper Company, Rumford Falls, Me., to Jones & Laughlin Steel Company; 200 tons for water supply pipe line, Jersey City, to the Lorentz Iron & Machine Works, the Lukens Iron & Steel Company to furnish the plates; 300 tons for the Dwight Mfg. Company, Chicopee, Mass., to the Lackawanna Steel Company. Some 2800 tons for the Astor apartment house, Broadway and Eighty-ninth street, is also reported closed and 300 tons for a trestle at Esmont, Va. The Beaver Engineering & Contracting Company is in the market for about 3000 tons of plate pipe 66 in. in diameter for Brooklyn, and the Staten Island Shipbuilding Company has been awarded two of the Government ocean going tugs, taking about 300 tons of plates each. Bids have been asked June 2 for a bridge over the Ohio River for the Chesapeake & Ohio, involving 15,000 tons and a department store, requiring 1200 tons, is to be built in Atlanta, Ga. A large tonnage of reinforcing bars, probably in excess of 1000 tons and a considerable amount of structural material, will be needed for the American Ever Ready Company's factory, Long Island City, to be built of reinforced concrete. Considerable reinforcing bars will also be needed for the Onondaga Hotel, Syracuse. Perhaps 12,000 tons will cover the material on which bids will be taken this month for subway work, not including an unusually large tonnage of cast segments for the East River tunnels. We quote mill shipments of steel bars, plates and structural material at 1.15c., Pittsburgh, or 1.31c., New York, and iron bars at 1.22½c. to 1.27½c., New York. For lots from store we quote iron and steel bars at 1.80c. to 1.85c., New York, and plates and shapes, at 1.85c. to 1.90c. What is done in shafting in large lots carries a discount of 65 to 68 per cent.

Ferroalloys.—The English producers of 80 per cent. ferromanganese have reduced the price $1 per ton to $38, seaboard. No sales or inquiries, even of small lots, are reported. Ferrosilicon, 50 per cent., continues dull at $71 to $73, Pittsburgh, according to the tonnage involved. It is said that there are some requests to hold back shipments on ferromanganese called for in contracts made in the early part of the year.

Cast-Iron Pipe.—This branch of trade is exceedingly quiet. No new public lettings of importance are in sight and the private demand is slow. Heavy accumulations of stock by one of the Delaware River foundries have caused offerings to be made broadcast at low prices, and carload lots of 6-in. are now to be had at $20.50 to $21 per net ton, tidewater.

Old Material.—Aside from a sale of 1000 tons of heavy melting steel scrap to an eastern Pennsylvania consumer at $10.75 delivered, transactions have been exceptionally few and small. Wrought scrap continues neglected and weak, while almost nothing is being done in cast scrap. The following quotations, per gross ton, New York, are made by dealers:

Old girder and T rails for melting	$8.00 to $8.50
Heavy melting steel scrap	8.00 to 8.50
Relaying rails	21.50 to 22.00
Rerolling rails	10.00 to 10.50
Iron car axles	17.50 to 18.00
Steel car axles	11.75 to 12.25
No. 1 railroad wrought	10.00 to 10.50
Wrought-iron track scrap	9.00 to 9.50
No. 1 yard wrought, long	8.50 to 9.00
No. 1 yard wrought, short	8.00 to 8.50
Light iron	3.25 to 3.50
Cast borings	5.75 to 6.00
Wrought turnings	5.50 to 5.75
Wrought pipe	8.00 to 8.25
Carwheels	10.00 to 10.50
No. 1 heavy cast, broken up	10.50 to 11.00
Stove plate	7.50 to 8.00
Locomotive grate bars	6.00 to 6.25
Malleable cast	7.25 to 7.75

British Market Lifeless

Pig Iron Firm, but Steel Affected by Weakness on Continent

(By Cable)

LONDON, ENGLAND, May 13, 1914.

Cleveland pig iron is firm, as the result of decreasing stocks, but the market shows no life. Active furnaces in Scotland, Cleveland and Cumberland number 168, against 169 last week and 209 a year ago. Steel has an easy tone, being affected by the weakness of material on the Continent, where merchants are cutting severely. The Standard Oil Company has bought a good line of tin plates, undercutting Wales. The

general tin-plate trade is poor though large shipments are being made. Receipts of tin plates at Swansea have been 124,000 boxes and shipments, 202,000 boxes; stocks, 248,000 boxes. Stocks of pig iron in Connal's stores are 91,915 gross tons, against 96,432 tons a week ago. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 12s. 6d. ($3.04).

The following prices are per ton of 2240 lb.:

Cleveland pig-iron warrants (Tuesday), 51s. 4½d. ($12.50), against 51s. 4d. ($12.49) a week ago.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 51s. 7½d. ($12.56).

Hematite pig iron, f.o.b. Tees, 61s. 6d. ($14.96), against 61s. 9d. ($15.02) a week ago.

Sheet bars (Welsh), delivered at works in Swansea Valley, £4 10s. ($21.89).

Steel bars, export, f.o.b. Clyde, £5 15s. ($27.98).

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £5 12s. 6d. ($27.37).

Steel ship plates, Scotch, delivered local yards, £5 17s. 6d. ($28.59).

Steel black sheets, No. 28, export, f.o.b. Liverpool, £8 15s. ($42.58).

Steel rails, export, f.o.b. works port, £5 12s. 6d. ($27.37).

The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.:

German sheet bars, f.o.b. Antwerp, nominal.

German 2-in. billets, f.o.b. Antwerp, 73s. ($17.75).

German basic steel bars, f.o.b. Antwerp, £4 2s. ($19.95), against £4 3s. to £4 4s. ($20.19 to $20.43) a week ago.

German joists, f.o.b. Antwerp, £5 2s. to £5 5s. ($24.82 to $25.55).

Freight rates from Antwerp to New York, Boston, Philadelphia and Baltimore, per 1000 kilos (2204 lb.), are about as follows: Billets, blooms and bars, up to 20 ft., 9s. to 10s. ($2.19 to $2.43). Iron and steel sheets, 11s. to 12s. 6d. ($2.68 to $3.04). Beams up to 30 ft., 12s. 6d. ($3.04).

Russia's Pig Iron Needs Help—European Works Cut Steel Prices—Chilean Ore

(By Mail)

LONDON, April 30, 1914.

There is no life about the pig iron market, buying remaining of the most reserved character, while if prices are maintained it is only because of the restricted output of the Cleveland blast furnaces. It is believed there is a more or less agreed upon curtailment of the make. With no available surplus of iron in the hands of the makers, the quantities in the public stores (less than 100,000 tons of No. 3) certainly do not betray any tendency toward an expansion that would induce a drop in prices. There is very little new buying of pig iron, but for all that a steady trade is passing with consumers, as is shown by the statistical position. The essential facts are that the output of iron is below the demand, for to meet current demands there is a continued drain upon the quantities held in stores. The only new feature which has developed has been the buying of hematite for Russia, a good tonnage of east coast iron having been taken up for that country, where there is a veritable dearth of raw material. At least 250,000 tons of German iron have been bought for Russia to eke out the insufficient home supplies. Further buying seems to be imminent, and this is at present the only bright spot in an otherwise gray sky. Of course, there may be a change for the better soon, but people are getting tired of the long waiting process. Business has been done in Rubio ore at about 17s. 4½d. ($4.23) a ton, c.i.f. Tees, while coke is about 17s. ($4.14) delivered at the blast furnaces. Buyers, however, will not pay more than about 17s. for ore and business remains very poor.

In the market for semi-finished steel the position is more or less dominated by that on the Continent, and this it may as well be admitted, is frankly bad. There is not the least resistance shown by works, and each week sees lower and lower prices, though the Germans, true to their traditions of recent years, are putting up a better fight than their competitors, and even today talk about 80s. ($19.47) f.o.b. for sheet bars, while the French and Belgians would accept c.i.f. business at about that figure. The markets are very tame, indeed, and even the wretchedly low rates asked do not serve to tempt consumers. Finished Continental steel is much the same as semi-finished, and one depth only serves to reveal another depression. Within the last few days Belgian basic bars have been done for the far East at a price working out at somewhere round 81s. ($19.71) f.o.b., and 84s. or 85s. ($20.69) represents what is named by German works. The latter continue to ask a premium over Belgian material, but needy works are quietly accepting competitive prices. It is no good holding out for impossible figures, and this conclusion seems to be forcing itself at last upon the conviction of the Germans. It is becoming almost a saying among buyers that "no reasonable offer will be refused," and this is almost literally true, more particularly where heavy stuff is concerned, for works want orders that run into tonnage. Heavy blooms, for instance, could be done certainly at less than 70s. ($17.03) f.o.b., and French sheet bars have actually sold at 80s. ($19.47) c.i.f. Newport. Trade is at sixes and sevens with such prices as these ruling.

In the finished departments there is an all-round want of work, and partial employment only is pretty general. There has been no actual alteration in the Scotch steel trade position, but so far the disruption of the association there has not entailed the collapse of the northeast coast body. Not a great deal is being done, and where ship plates are concerned the Germans and Belgians are very cheap sellers. Some talk of increased bookings of new ships is heard, but the business placed is hardly of much importance, though there is still a fair amount of building in progress.

The Welsh tin plate trade is in a wretchedly poor way and there seems to be no bottom to prices, while buyers will not be tempted. Some of the merchants have been rather badly bitten by the slump and there is consequently a fair amount of second-hand stuff still about waiting to be liquidated at a favorable moment.

An interesting item of news is that a fair quantity of Tofo (Chile) iron ore has been sold to steel makers on the west coast of Scotland, and that an 8000-ton cargo is on the way to the Clyde, with others to follow. It is stated that the Bethlehem Steel Company intends to sell the ore regularly to the European market.

German Conditions Worse

Depression in Trade Testing the Strength of Combinations

BERLIN, May 1, 1914.

All the news that has come to hand has been unfavorable. Export prices have further yielded. A week ago a drop of 1s. (24c.) a ton for ingots, billets, bars and plates was reported, and yesterday further reductions were published. Steel bars are now quoted at 84 to 85s. ($20.44 to $20.69), against 85s. ($20.69) last week; thin plates, Nos. 12-14, at 101 to 102s. ($24.57 to $24.82), against 102 to 103s. ($24.82 to $25.06); No. 20 sheets, at 121s. ($29.44), against 122s. ($29.69); ordinary wire, No. 0-8, at 115s. ($27.98), against 117.50s. ($28.59). (All f.o.b., Antwerp.)

Competition in ship plates has become still sharper, owing to the fight between the organized works and the huge Gelsenkirchen company, and the price has now dropped to 100 marks ($23.80). It is mentioned that there is no prospect of an early agreement between the two contending parties, owing to the great divergence of views about quotas.

The most important piece of news this week about questions of organization is the announcement made by the Rheinische Stahlwerke that it will not join in renewing the Coal Syndicate unless an understanding be reached before the end of the year for renewing existing trade organizations in the iron industry for the full

term to which it is proposed to extend the Coal Syndicate, namely, to March 31, 1921. The company points out that certain of its competitors are trying to get all the business in finished products coming on the market, and to that end are increasing their producing capacity unreasonably. It further says that this policy, together with the discontinuance of the syndicate arrangement in finished products, has reduced prices for the latter to such a point that profits can no longer be earned. The company is ready to take its chances with open competition in coal if finished steel products are to remain outside of trade combinations.

Owing to this action, further negotiations for the prolongation of the Coal Syndicate have been postponed till next fall; and the general feeling is that the time is now too short to effect agreements in the iron trade such as the Stahlwerke demands. However, the Steel Works Union meets next week to discuss the situation, and the Pig Iron Syndicate will also meet soon for the same purpose. So far as these two organizations are concerned it is believed that their prolongation to 1921 can be arranged without any great difficulty; but it is regarded as impossible to establish strong combinations in finished products not now syndicated.

The year book of the Dortmund mining district contains considerable information about construction recently completed or still in progress. At the open-hearth plant of the Bochum Guss-stahl Verein two mixers of 300 tons capacity each will render the company independent of scrap steel. It will use pig iron wholly and will effect a saving of 20 to 25 per cent. in coke and other expenses, and it is not necessary that the iron used be free of phosphorus. In connection with its improved steel plant it has begun to build a fifth blast furnace. Similar work is going on with the Deutsch-Luxemburg Company. At its Differdingen branch it is building its third mixer, which will have a capacity of 1250 tons, or the biggest in Germany. At the Hoesch Works in Dortmund the sixth blast furnace was finished near the end of 1913, and the seventh is nearing completion. Its wire mill costing nearly $1,000,000 went into operation at the beginning of this year. The gas-machine battery of the Gelsenkirchen company at its Adolf-Emil-Hütte in Esch, Luxemburg, has a capacity of 44,000 hp. The Phönix Company is building a very large blast furnace at Duisburg-Ruhrort, being its eighth at that place, and it is building a great machine shop, costing $1,000,000, at its Hermannhütte. Improvements in gas saving and treatment, and in transportation facilities, are also under construction. The Aumetz-Friede Company in Lorraine has about finished the transformation of its steel plant, bringing its capacity up to 600,000 tons.

Germany's production of crude steel in the first quarter of 1914 amounted to 4,665,986 metric tons. Production in March reached 1,597,111 tons, or about 13,300 tons more than in January.

Reports from the Belgian trade continue pessimistic. The situation in the northern district of France appears to have undergone a decided change for the worse. The number of works that are idle one or more days in the week is increasing, and bad reports are given from various sections of the trade.

Metal Market

NEW YORK, May 13, 1914.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
May	Lake	Electro-lytic	Tin, New York	New York	St. Louis	New York	St. Louis
6	14.50	14.20	33.10	3.90	3.80	5.10	4.95
7	14.50	14.20	33.50	3.90	3.80	5.10	4.95
8	14.37½	14.05	33.35	3.90	3.80	5.15	5.00
9	14.37½	14.05	.....	3.90	3.80	5.15	5.00
11	14.37½	14.12½	33.40	3.90	3.80	5.15	5.00
12	14.37½	14.12½	33.70	3.90	3.80	5.15	5.00

There have been freer offerings of resale copper at concessions. Tin is stronger because of support from London, but buying has been moderate. Lead is quiet, but firm. Spelter shows greater strength despite lack of demand. Antimony has a little better tone though the market is quiet.

New York

Copper.—Since the appearance on May 8 of the April statement of the Copper Producers' Association both first and second hands have sold metal to a moderate extent, while just prior to the statement every one was waiting and there was no activity. The statement, showing production for the month to be 151,500,531 lb. an increase of 5,848,549 lb., while deliveries decreased 13,641,666 lb., was regarded as unfavorable though not so bad as it might have been considering all conditions. When the figures became known the prices of first hands began to sag and they offered to sell electrolytic at 14.25c., delivered, 30 days, while the metal in second hands eased off still more. On Friday, Saturday and Monday there was talk of offerings as low as 14c. cash, f.o.b. New York, but it was extremely hard to locate this metal and its existence was questioned by some. London was not adversely affected to any great extent by the statement and this brought about some business this week. The quotation yesterday was 14.25c. delivered, 30 days, or 14.12½c., cash, New York. There has been no activity in Lake and prices are nominal at 14.37½c. to 14.50c. The quotations in London to-day are £63 2s. 6d. for spot and £63 12s. 6d. for futures. The exports this month total 14,141 tons.

Tin.—On Monday several hundred tons were sold for future delivery, but this was the only day on which there was any heavy buying; otherwise the market has been rather quiet with business small, but steady. Recent declines in London have been so great and the losses so heavy that the London houses are now understood to be getting together to prevent any further decline. One big London dealer is trying to help matters by refusing to take any selling orders, explaining that he desires to hold the market up. The situation is serious for the reason that should prices go lower certain sellers might not be able to make good on their contracts and this would prove injurious to the trade generally. The agreement implied in these reports from abroad has made this market firmer. Yesterday 33.70c. was quoted. The London quotations to-day are £153 5s. for spot and £155 for futures. There is afloat 1300 tons and 1294 tons has arrived this month.

Lead.—The market is quiet but its tone is firm. The New York price is 3.90c. and that of St. Louis 3.80c., and at these quotations sellers are unwilling to go into June, preferring to await developments with regard to future deliveries.

Spelter.—Although there has been no noteworthy increase in demand, producers have stiffened their prices and are now asking 5.15c., New York, and 5c., St. Louis.

Antimony.—The stronger tone noted a week ago still prevails and Hallett's is about 10 points higher at 6.85c. to 7c. Cookson's is 7.25c. to 7.35c. and other grades range from 5.75c. to 6.35c.

Old Metals.—The market continues dull. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible	13.75 to 14.00
Copper, heavy and wire	13.25 to 13.50
Copper, light and bottoms	12.50 to 12.75
Brass, heavy	9.00 to 9.25
Brass, light	7.75 to 8.00
Heavy machine composition	12.25 to 12.50
Clean brass turnings	8.75 to 9.00
Composition turnings	11.25 to 11.50
Lead, heavy	3.65
Lead, tea	3.40
Zinc scrap	4.25

Chicago

MAY 11.—Trading in copper has been light. The decline in tin is still under way. A slight reaction in the spelter market shows itself in noticeably firmer quotations. We quote as follows: Casting copper, 14.25c.; Lake copper, 14.50c. to 14.75c. for prompt shipment; small lots, ¼c. to ⅛c. higher; pig tin, carloads, 34c.; small lots, 36c.; lead, desilverized, 3.85c., and corroding, 4.10c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5c. to 5.10c.; Cookson's antimony, 9.50c. for cask lots; other grades, 8c.; sheet zinc, $7, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 11.50c.; copper bottoms,

10.25c; copper clips, 10.75c.; red brass, 10.75c.; yellow brass, 7.50c.; lead pipe, 3.30c.; zinc, 3.50c.; pewter, No. 1, 23c.; tinfoil, 26c.; block tin pipe, 29c.

St. Louis

MAY 11.—Missouri metals have been steadier and firmer. Lead is now quotable at 3.85c.; spelter, 4.97½c. to 5c.; tin, 33.65c. to 33.85c.; Lake copper, 14.75c. to 14.87c.; electrolytic copper, 14.60c. to 14.75c.; Cookson's antimony, 7.50c.to 7.60c. In the Joplin ore market there was a somewhat better feeling, and the basis range was $35 to $40 per ton for 60 per cent., with top settlements at $43. Calamine was stronger at $20 to $21.50 for 40 per cent., with the highest grades $26. The price for 80 per cent. lead ore was very firm at $46. Miscellaneous scrap metals are quoted as follows: Light brass, 6c.; heavy yellow brass, 8c.; heavy red brass and light copper, 10c.; heavy copper and copper wire, 11c.; zinc. 3c.; lead, 3.25c.; tea lead, 3c.; tinfoil, 29c.; pewter, 23c.

Iron and Industrial Stocks

NEW YORK, May 13, 1914.

The stock market has been under some pressure, notwithstanding the brilliant crop report issued by the Department of Agriculture which would ordinarily have a stimulating effect on values of securities. General business conditions are too discouraging for stock operators to undertake much of an upward movement. The market also appears to be awaiting the freight rate decision by the Interstate Commerce Commission. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., pref.	41⅞	Pressed Stl., pref.	102
Am. Can, com.	26 - 27½	Ry. Spring, com.	27½ - 28⅛
Am. Can, pref.	89⅝ - 90½	Republic, com.	22 - 22½
Am. Car & Fdy., com.	48⅜ - 49⅜	Republic, pref.	85⅜ - 85¾
Am. Loco., com.	29½ - 31⅞	Rumely Co., com.	8⅞ - 10
Am. Loco., pref.	98	Rumely Co., pref.	26 - 28
Am. Steel Fdries.	29½ - 31½	Sloss, pref.	87
Bald. Loco., com.	48 - 48½	Pipe, com.	10
Beth. Steel, com.	40¾ - 42⅝	Pipe, pref.	39
Beth. Steel, pref.	85	U. S. Steel, com.	58⅛ - 59⅞
Case (J. I.)	82 - 82¾	U. S. Steel, pref.	108 -108¾
Colorado Fuel	27 - 27½	West'g'hse Elec.	73½ - 74½
Deere & Co., pref.	94¼	Am. Ship, com.	37
General Electric	146½-147	Am. Ship, pref.	76
Gt. N. Ore Cert.	31 - 31¾	Chic. Pneu. Tool.	53 - 54
Int. Harv., com.	105 -109⅛	Cambria Steel	46¾ - 47
Int. Harv., pref.	116⅛	Lake Sup. Corp.	18¾ - 19¼
Int. Harv., Corp.	104 -106	Pa. Steel, pref.	59½ - 60
Int. Pump, com.	6½	Warwick	10½
Int. Pump, pref.	20	Cruc. Steel, com.	14½ - 14¾
Lackawanna Stl.	32	Cruc. Steel, pref.	90½ - 91
Nat. En. & St., com.	10⅛	Harb. Wk. Ref., pref.	98½
Pressed Stl., com.	42 - 43	La Belle Iron, com.	36½

Dividends Declared

The Niles-Bement-Pond Company, regular quarterly, 1½ per cent. on the preferred stock, payable May 15.

The Pratt & Whitney Company, regular quarterly, 1½ per cent. on the preferred stock, payable May 15.

The American Steel Foundries Company, regular quarterly, ½ of 1 per cent., payable June 30.

The J. G. White Engineering Corporation, regular quarterly, 1¾ per cent. on the preferred stock, payable June 1.

The J. G. White Management Corporation, regular quarterly, 1¾ per cent. on the preferred stock, payable June 1.

The Canadian Car & Foundry Company, Ltd., 2 per cent. on the common stock, payable June 2.

The Studebaker Corporation, regular quarterly, 1¾ per cent. on the preferred stock, payable June 1.

The Moline Plow Company, regular quarterly, 1¾ per cent. on the first preferred stock, payable June 1.

The Pittsburgh Steel Company, regular quarterly, 1¾ per cent. on the preferred stock, payable June 1.

Coke-oven gas for steam generation is to be used by the Newcastle-on-Tyne Electric Supply Company, England. The company will purchase the surplus coke-oven gas of the Teams By-Product Company, which has a large battery of ovens one and one-half miles distant.

George G. Moody, assistant to the president of Joseph T. Ryerson & Son, has returned to Chicago after a brief visit to Excelsior Springs, Mo.

Comparative Tests of Chilled Iron and Steel Carwheels

Extensive tests made at Purdue University and by the American Brake Shoe & Foundry Company for the Association of Chilled Car Wheel Manufacturers show in a report by F. K. Vial, chief engineer of the association, that the wear of the chilled iron carwheel upon brake shoes is 25 to 50 per cent. less than the steel wheel. Examination showed that the difference in the coefficient of friction, and hence the metal losses, was due to the difference in the structure of the two materials. The grain of the chilled iron is at right angles to the tread, like the end grain of wood, so that the action is regarded as purely frictional; whereas the tread of the steel wheel is more or less fibrous in the direction of the circumference, causing the metal to roughen, reduce the friction and tear away the metal. It was demonstrated that the chilled iron wheel gives 20 per cent. greater coefficient of friction, 20 per cent. greater tangential pull, 20 per cent. shorter stops, less wear as stated above and a greater number of stops per life of brake shoe than the steel wheel. It is estimated that the use of the chilled iron wheel would save the railroads in this country $2,000,000 a year.

Rebuilding a Blooming Mill in 12 Days

The rebuilding of a blooming and finishing mill in 12 days is the subject of a short article in *Stahl und Eisen* for April 16. This unusual piece of work was accomplished at the works of the Aachener Huetteverein at Rothe Erde near Aix-la-Chapelle. An old blooming mill, having a roll diameter of 40 in. and a slab length of 8 ft. 3 in., was replaced with a new mill having 45-in. rolls and a slab length of 9 ft. A new driving engine and electrically operated auxiliary gear were installed, the new engine being situated 55 ft. further away from the shears than the old one. A new base plate and enclosed interchangeable housings were furnished for the finishing mill, which has 26-in. rolls and is located behind the blooming mill. It was possible to erect the new engine and to commence the construction of the foundation and the erection of the base plate while the old mill was still in operation. The train was supported on a wrought-iron frame which could be dug under and underpinned.

Stove Makers' Defense Association

The Stove Founders' National Defense Association held its annual meeting at the Hotel Astor, New York, this week; discussed the use of the molding machine in stove foundries; gave its president, George Mitchell, a present of $4000; discontinued the office of assistant secretary, and elected the following officers: President, George Mitchell, Pittston, Pa.; first vice-president, Lewis Moore, Joliet, Ill.; second vice-president, Arthur W. Walker, Boston; treasurer, William A. Dwyer, Detroit; secretary, Thomas J. Hogan, Chicago.

The New York State Steel Company's property at Buffalo, N. Y., will be sold by the receivers May 25, pursuant to an order of the United States District Court. The sale will take place in the vestibule of the City and County Hall, Buffalo, at 10 a. m. Foreclosure sale will be made of the real estate, comprising 29 acres, with all the buildings, while it is intended to sell five locomotives, two locomotive cranes and a large quantity of raw material and other supplies, inventorying over $100,000, either in parcels or as a whole.

The Leonard Machine Works, Philadelphia, of which Chester S. Leonard is the head, has moved from 3120 Market street to 1222 Race street, where it will have increased space and facilities.

The Fitzsimons Company, maker of polished shafting and special shapes, Youngstown, Ohio, has opened an office in the Sheldon Building, San Francisco, Cal., with A. B. Ambler in charge.

OBITUARY

Paul Louis Toussaint Héroult

Dr. Paul Louis Toussaint Héroult, a pioneer in the electrometallurgy of aluminum and steel, died in France May 9 from an attack of typhoid fever. While he had not enjoyed good health for some time, his death at the age of fifty-one was hardly expected. He was born at Thury-Harcourt on April 10, 1863, and was educated at the Lyceum of Caën, Normandy, and later at St. Barbe, Paris, where he graduated in 1882 to enter Ecole des Mines, Paris. In 1883 he served in the French Army, and then having to conduct his father's tanning business, he never finished his School of Mines studies. He continued his metallurgical researches, however, and in 1886 with a small electric machine developed his alumina reduction process, for which he was granted patents in France, England and the United States. The process for manufacturing aluminum was first put into practical operation July 30, 1888, at the works of the Société Metallurgique Suisse, at Neuhausen near Schaffhausen.

His electric aluminum furnace became an instrument for further researches. He made in it the first commercial calcium carbide produced in France, and in undertaking the manufacture in a similar way of artificial corundum, ferrochrome and ferrosilicon, he was led to the investigation of the use of the electric furnace in the iron and steel industry. His successes in this field need no description at this time.

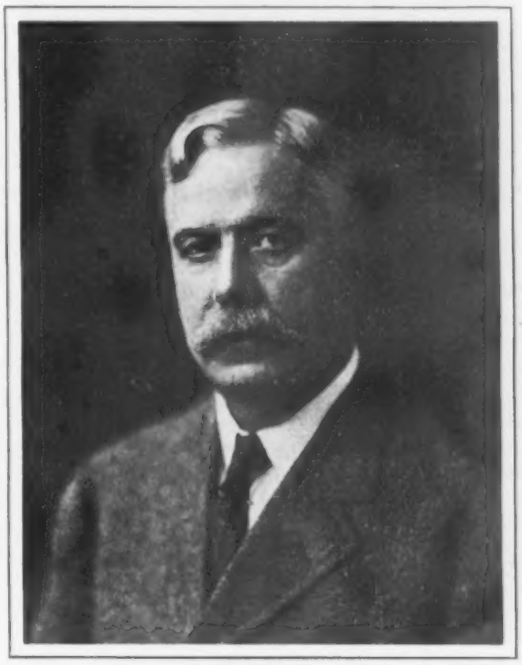
He made a number of extended visits to this country and had a host of friends in the United States. He was naturally the recipient of numerous honors and conspicuous among those early bestowed was the action of the Technische Hochschule of Aachen, Germany, which in 1902, when it opened its new Institute of Metallurgy, gave him the honorary degree of doctor-engineer. The accompanying portrait is shown by courtesy of Metallurgical and Chemical Engineering.

DR. PAUL HÉROULT

WILSON B. CHISHOLM, president Champion Rivet Company, Cleveland, Ohio, died May 10, aged 65 years. He had been in poor health for a number of years, following a stroke of apoplexy, and during that time had practically retired from active business. He was born in Montreal, Canada, and when a boy his father, Henry Chisholm, moved to Cleveland. The latter was one of the founders of the Cleveland Rolling Mill Company, of which his son, Wilson B., was vice-president and manager for about 15 years. He was also interested in the Chisholm & Moore Mfg. Company, Cleveland, of which his brother, S. H., is president. He was widely known as a horseman. He leaves a widow, three daughters and two sons. One of the latter, Henry, is secretary-treasurer of the Champion Rivet Company.

Alexander B. Scully

Alexander B. Scully, president Scully Steel & Iron Company, died May 7 at his home in Chicago, aged 58 years. He was born in Chicago and educated in the local public schools. After leaving school he became a messenger boy for the Western Union Telegraph Company. In 1875 he entered the employ of Joseph T. Ryerson, remaining until 1885. In 1886 he assisted in forming the firm of W. S. Mallory & Co., who sold their business to Joseph T. Ryerson & Son in 1890. In 1891 he formed the Scully-Castle Company, which later became the Scully Steel & Iron Company, of which company he was president up to the time of his death. He leaves a widow and two sons.



ALEXANDER B. SCULLY

W. T. HARDESTY, vice-president and general manager of the Trumbull Steel Company, Warren, Ohio, died May 7 after an illness of several weeks, from heart trouble, aged 57 years. He had lived practically all is life in the Mahoning Valley in Ohio, during which he devoted his time to the sheet and tin-plate industry. He is credited with erecting the first tin-plate mill in the United States, having superintended in 1892 the erection of a tin-plate mill for the Falcon Iron & Nail Company, Niles, Ohio. For a number of years he was a district manager of the American Sheet & Tin Plate Company with headquarters in Niles. Several years ago, with Jonathan Warner and others, he purchased the Empire mill at Niles with which he was connected until it was sold to the Brier Hill Steel Company. Then the Trumbull Steel Company was organized and he had charge of the erection of this plant about two years ago.

GEORGE M. BLACK, Detroit, Mich., manufacturer and capitalist, died May 4, following a short illness, aged 53 years. He was born in Detroit and began his active career at the age of 15. He entered the employ of the late Senator McMillan in 1880 and for a number of years had been secretary of the interests represented by the McMillan estate. Among his business connections were the following: Treasurer, Detroit Seamless Steel Tube Company; secretary, Monarch Steel Castings Company; secretary, Michigan Malleable Iron Company; director, Michigan Sprocket Chain Company; assistant treasurer, Packard Motor Car Company; secretary-treasurer, Detroit & Cleveland Navigation Company. He was also a director in a number of other institutions. In club, civic and hospital affairs Mr. Black took an active interest. He leaves a widow and one son.

The Production of Steel Direct from Ore*

Experimental Heats Showing Its Possibilities in an Arc Furnace of the Heroult Type—Effect of Nitrogen and Hydrogen

BY ERNEST HUMBERT AND AXEL HETHEY

The first iron and steel that we know of in history was produced by more or less direct reduction of iron ore in somewhat primitive furnaces. The best examples of this material are afforded by the old Damascus and Toledo blades. Although the steel of which these swords were made was sometimes of very uneven composition and full of slaggy enclosures, it certainly possessed remarkable qualities of strength, endurance and toughness. It is, even nowadays, difficult to produce material to equal these old direct steels. Direct iron and steel has been made all over the world, usually in districts where simple surface ores were found with a convenient supply of charcoal. Modern methods of manufacture, however, with their large productions and consequent cheapness of manufacture, have in the last century displaced these direct processes.

Now that modern conditions demand such severe specifications for steel, the steelmaker is daily experiencing greater difficulty in meeting these demands, with the result that he has had to go from a simple carbon-manganese iron alloy to costly and complicated alloys of iron with more or less rarer metals. The difficulty experienced in eliminating such impurities as oxygen, phosphorus, sulphur, and silicon, and the practical failure to eliminate nitrogen and hydrogen, led the authors to search for a method of manufacture with which a purer steel could more readily be obtained. Remembering the old adage that prevention is better than cure, and seeing the satisfactory results that were obtained with the old imperfect methods of production, the authors' attention was drawn to direct processes of manufacture. Considering the experiments which Stassano and others made some years ago, and the practicability of the modern electric furnace, it was decided that an ordinary arc furnace would sufficiently fulfil the necessary conditions to enable experiments on a somewhat more practical scale to be made. The ease with which an electric furnace can be controlled, and oxidizing and reducing conditions obtained at will, were the chief factors influencing this decision. The various heats were made in a normal Héroult electric furnace of 6-ton capacity and working with single phase current.

Three series of tests were made:

Series A.—Direct reduction of silicious Swedish iron ore. 1. One heat of hard steel. 2. One heat of rail steel. 3. One heat of soft steel.

Series B.—Direct reduction of Swedish and a silicious Swedish iron ore, with 30 per cent. of scrap mixed with the charge.

Series C.—Direct reduction of Brazilian iron ore.

[In the original paper the log and details of the action of each heat or experiment are given. This information is condensed here to the bare results in each case.]

SERIES A.—*Hard Steel:* The total charge consisted of 6300 kg. of the Swedish ore, 1200 kg. of coke and 950 kg. of lime. The weight of steel produced, after 16 hr. working, was 3600 kg. of ingots with 120 kg. of scrap, the loss of iron in melting being 6.50 per cent. The electric energy consumed was 2459 kw.-hr. per ton of steel. The analysis of the steel, which forged well, was as follows:

	Per cent.
Carbon	1.39
Phosphorus	0.055
Sulphur	0.038
Silicon	0.13
Manganese	0.26

Rail Steel: The total charge consisted of:

	Kg.
Iron ore	5850
Scrap	200
Coke	1000
Lime	1010
Limestone	260
80 per cent. ferromanganese	12
10 per cent. ferrosilicon	20

The weight of steel produced, after 18 hr. and 35 min., was 3630 kg. of ingots and 85 kg. of scrap, the loss of iron in melting being 4.16 per cent. The electric energy consumed was 2862 kw.-hr. per ton of steel. The analysis of the final steel, which was reported as easy to forge and very tough, was:

	Per cent.
Carbon	0.56
Phosphorus	0.023
Sulphur	0.027
Silicon	0.15
Manganese	0.28

Soft Steel: The total charge was as follows:

	Kg.
Iron ore	5650
Scrap	200
Coke	930
Lime	1035
80 per cent. ferromanganese	25
10 per cent. ferrosilicon	50

The weight of the steel produced after 18 hr. and 45 min. was 3580 kg. of ingots and 10 kg. of scrap, the iron melting loss being 4.66 per cent. The consumption of energy was 2843 kw.-hr. per ton of steel. The final steel forged well and a test piece bent 180 deg. without fracture. A ⅜-in. round bar of it was twisted cold into a double knot. Its analysis was as follows:

	Per cent.
Carbon	0.23
Phosphorus	0.015
Sulphur	0.030
Silicon	0.11
Manganese	0.47

SERIES B.—In this experiment, where 30 per cent. of scrap was used, the total weight of the charge was:

	Kg.
Iron ore	4300
Scrap	1200
Coke	750
Lime	950
80 per cent. ferromanganese	7.5
Ferrosilicon	11.0

The steel produced, after 14 hr. and 15 min., amounted to 2970 kg. of ingots and 215 kg. of scrap, the iron lost in melting being 18 per cent. The electric energy consumed totaled 2602 kw.-hr. per ton of steel. The final steel forged similar to tool and crucible steel and analyzed as follows:

	Per cent.
Carbon	0.89
Phosphorus	0.014
Sulphur	0.037
Silicon	0.10
Manganese	0.27

SERIES C.—In this experiment, involving the direct reduction of Brazilian ore, the total weight of the charge was:

*Part of a paper presented at the London meeting of the Iron and Steel Institute, May 7 and 8.

	Kg.
Iron ore	5000
Scrap	200
Coke	1050
Lime	250
Fluorspar	20
80 per cent. ferromanganese	17.5
10 per cent. ferrosilicon	20

The weight of the steel produced, after 14 hr. and 40 min., was 3269 kg. of ingot and 90 of scrap, the iron lost in melting being 2.54 per cent. The energy consumed was 2709 kw-hr. per ton of steel and the steel, which forged very well and welded easily, had the following composition:

	Per cent.
Carbon	0.27
Phosphorus	0.031
Sulphur	0.058
Silicon	0.05
Manganese	0.31

With this heat the authors attempted to prove that steel direct can be made without the carbon being above 0.40 per cent. at any time during the heat. Tests were taken at short intervals to show that the carbon content remained below this figure. Working in this manner, however, more time is taken, as the melting point of a low carbon steel is much higher and the material is not so fluid. A good carbon content for normal working was found to be about 0.60 per cent.

Consumption of Electrodes.—The electrodes were weighed before they were put into the furnace and after their removal. Two qualities of electrodes were used. The first two electrodes broke several times and their consumption was 36 1-3 kg. per ton of steel. The two others did not break, and their consumption was 32 kg. per ton of steel.

Wear of Furnace Lining.—The wear was approximately the same as when melting scrap. For the first heat the roof was attacked by the violent ebullition. With a furnace especially constructed for this class of work this will be avoided, and these repairs would be very small.

THEORETICAL CONSIDERATIONS

The charges are divided up into portions so as to make melting easier. It is important to have the various constituent materials of small and equal size (nut size). Coke or scrap is added in each case to establish the electrical circuit readily. Melting proceeds quite normally. Reduction of the ore also follows normal chemical laws. There is much ebullition owing to the large volume of oxides of carbon set free from the liquid bath. This is an essential difference from the reactions in modern blast furnaces, where spongy iron is first produced and then melted. When all the ore is reduced, the slag should be taken off the bath, and the charge treated as an ordinary pig and scrap charge. If the bath contains too much carbon, ore should be added; if too little carbon, the charge should be recarburized in any convenient manner. A final basic slag, consisting of lime and treated with coke to produce a slag containing calcium carbide, should be obtained to reduce any excess of oxide. The final additions of ferromanganese, ferrosilicon, etc., are added and the heat finished and poured in a normal manner. Care should be taken that the slag is kept fluid and basic during reduction. A minimum of 0.50 per cent. carbon should be retained during reduction, as the iron may otherwise freeze on the bottom and cause delay and trouble. If scrap be used in the heat, it is better first to reduce the ore with an increased excess of carbon and to add the scrap when this charge is melted and ebullition dies down. The scrap should not be added with the ore. The charge will then melt more quickly and a quieter melt be obtained.

The outstanding quality of steel produced by this process is its toughness. From the rough forge tests made at the furnace, it was found that the steel would readily bend without fracture even when containing high percentages of carbon. In one case a drill made from the Series B heat and subjected to an unusual strain was bent 25 deg. from the horizontal. The authors regret very much that they were at the time unable to make any close analyses and other investigations of the material, but hope to present the results of a closer study of the subject in a future communication. To one point, however, they would like to draw attention.

NITROGEN AND HYDROGEN IN STEEL

More and more is now being heard about the presence of gases in steel and their baneful influences. This applies more especially to the presence of nitrogen and hydrogen in steel, and it must be reckoned a distinct advantage of this process that these gases are never introduced into the charge. The only gases that can be imagined at present, are oxides of carbon with possibly traces of hydrogen. The effect of nitrogen on steel is generally considered to cause an increase in tenacity and hardness, thus producing brittleness and a decrease in elongation. It is usually considered that nitrogen has about five times the influence which phosphorus produces in that direction. It might be appropriate here to call attention to the importance of considering the quantity of nitrogen in steel. Opinions are much divided on that point, to a great extent owing to the absence of ready and reliable methods of analyses. A rough rule to ensure safety in specifications has been suggested as follows: The percentage of phosphorus plus five times the percentage of nitrogen should not exceed 0.06 per cent.

The following figures show the quantities of nitrogen present in steels of different carbon content:

1.15 per cent. carbon contain 0.030 to 0.035 per cent nitrogen.
0.50 per cent. carbon contain 0.040 to 0.045 per cent. nitrogen.
0.20 per cent. carbon contain 0.050 to 0.060 per cent. nitrogen.

These amounts of nitrogen may be taken as critical limits at which elongation begins to disappear and the steel is found to be very brittle. The presence of nitrogen is perhaps the cause of much of the brittleness found in many hard steels. The limits depend on the carbon content, and it will be noted that hard steels are rendered more readily brittle than mild steels. Nitrogen is supposed to be present in the ferrite constituent of the steel as a nitride. It does not combine with the iron carbides. Nitrogen is added to steel by means of the air-blast in the case of blast furnaces, converters, and cupolas. In the case of open-hearth furnaces, it is probably added in the shape of cyanogen and ammonium compounds by means of the flame.

To produce high carbon steels of highest qualities in the open-hearth furnaces, the gases should therefore be purified. Crucible steels are found to contain very little nitrogen. Commercial steels usually contain between 0.03 to 0.04 per cent. The most satisfactory substance for removing nitrogen from steel appears to be vanadium, which is, however, expensive to use.

The effect of hydrogen on steel is also little understood, but its action is probably similar to that of nitrogen. This may be inferred from the following example: When steel is pickled, nascent hydrogen is absorbed and the material is more brittle. Annealing, however, overcomes this effect by eliminating the absorbed hydrogen, bringing the material back to its original ductile state.

Although the authors have been unable to make analyses of the gases contained in this material, they conclude that from the nature of the process

and the toughness and ductility of the material obtained, both nitrogen and hydrogen are either absent or present in infinitesimal quantities. The question is one that commends itself for investigation.

CONCLUSIONS AND ECONOMIC ADVANTAGES

The authors have come to the conclusion that with the aid of the modern electric furnace, and given satisfactory conditions, the economic manufacture of steel direct from ore is a practical possibility. The material produced will be superior to that manufactured by present methods, and will have properties of the greatest importance and value to the steel user. A special type of furnace will probably be developed, although the standard Héroult furnace is satisfactory for occasional charges. The charge should lie deep in the furnace, to permit violent ebullition of the bath without overflowing. Anthracite electrodes will probably be found most satisfactory owing to their freedom from breakages. The best use for this process will be found in countries that possess readily available sources of water power together with deposits of pure rich ores. Charcoal, coke or anthracite coal can be used as fuel. In countries where cheap power, produced from waste heat such as blast-furnace gases, coke-oven gases, etc., can be obtained, its most useful sphere will probably be found in making high grade steels for springs, drills and similar tools, shafts, and all grades requiring exceptional toughness.

The economic advantages of this process are: 1. One operation instead of several. 2. One furnace instead of a large and complicated plant. 3. Simplicity, cleanliness and ease of control of electricity as a source of fuel and power. 4. Ability to use refractory and richer ores, such as titaniferous magnetites, etc. 5. Freedom of the steel from impurities. 6. Speed of manufacture. 7. General cost depends largely on cost of electric power, but will be cheaper than the electrical production of steel from pig iron. 8. Less labor needed. 9. Metallurgical simplicity of the process. 10. Efficient control of quality of steel to be obtained, both from an analytical and physical point of view.

Economies in Sand Manipulation*

BY A. M. THOMPSON

The introduction of new kinds of binders and of sand-mixing machinery has brought about a condition in some shops whereby all the core sand may be used over indefinitely, with only sufficient new sand added to take care of the waste.

As an illustration of this, some years ago in our foundry, the formula for core sand for arm cores for wheels or pulleys, rim cores, etc., consisted of 80 per cent. of sand and 20 per cent. of old sand. This large percentage of new sand necessitated hauling the cores out to the dump pile after they were knocked out of the castings, and paying for having them hauled away. The amount of new sand has been gradually reduced and gang-way and old core sand increased until the formula now used is 20 per cent. of new and 80 per cent. of old sand, this amount of new sand being necessary to give it body.

For green sand facing, we are using one-third new molding sand, one-third heap sand and one-third old cores which have been crushed in a cinder mill. These sand formulas are mixed in a pan mill in this manner: The heap sand and core sand are shoveled into the mill; then the new molding sand and seacoal or core compound, as the case may be, are added, making altogether 4 cu. ft. of sand. The mill is set in motion, and in five minutes the sand has been thoroughly incorporated and not a vestige of the new sand can be detected, the mixture being strictly black in color.

The action of the mill is to squeeze the old sand into the new sand and to separate the clay grains so that by the time the operation is done the light-colored new sand has entirely disappeared, or, in other words, completely dissolved. If the mill is allowed to run longer, the sand gets tough and is in better shape for gear teeth and deep-lifts and the sand (which, if mixed by the ordinary processes of shoveling and riddling, would have no bond and be unsatisfactory for facing) can be made as strong or tough as desired.

The following tables will show what can be accomplished in a jobbing shop of 25 or 30 molders:

CORE SAND

Formerly Used

40%, or 800 lb., of new molding sand, at $1.20 per ton	$0.48
40%, or 800 lb., of new sharp sand, at $0.60 per ton	0.24
20%, or 400 lb., of old core or gang-way sand	...
1 to 40, or 50 lb., compound, at $30 per ton	0.75
Total	$1.47

Now Used

20%, or 400 lb., of new molding sand, at $1.20 per ton	$0.24
80%, or 1600 lb., of old core sand	...
1 to 80, or 25 lb. compound, at $30 per ton	0.38
Total	$0.62
Difference in cost per ton	$0.85

FACING SAND

Formerly Used

⅓, or 666 lb., new molding sand, at $2.35 per ton	$0.78
⅓, or 666 lb., heap sand	...
⅓, or 666 lb., heap sand or old core sand	...
1 to 10, or 200 lb. sea coal, at $7 per ton	0.70
Total	$1.48

Now Used

⅓, or 666 lb., of new molding sand, at $1.20 per ton	$0.40
⅓, or 666 lb., heap sand	...
⅓, or 666 lb., heap sand or old core sand	...
1 to 10, or 200 lb., sea coal, at $7	0.70
Total	$1.10
Difference in cost per ton	$0.38

The difference in cost is because of the cheaper grade of new sand, it being possible to use this in the mixer.

CORE OIL SAND

By mixing core oil sand in a machine, a less quantity of oil is needed to give the same bond in the sand. The ratio when mixing by shovel and riddle was 1 to 45, while mixing by machine it is 1 to 60. The difference amounts to 25 per cent. A foundry using one 50-gal. bbl. a month at 40c. per gal. would save $5 per month.

SUMMARY

Core sand, 3 tons at 85c	$2.55 per day or $765 per year
Facing sand, 3 tons, at 38c	$1.14 per day or 442 per year
Core oil sand	60 per year
Total saving	$1,267 per year

To this may be added a saving of $300 a year in labor of mixing.

*From a paper read before the April meeting of the Chicago Foundrymen's Club.

The Welshofer Ringer Metallic Company, Buffalo, N. Y., and the Angle Window Company, Jamestown, N. Y., have been absorbed by the Angle Window & Door Company, Buffalo, for the manufacture of the exclusive product of windows and doors in steel and bronze. J. J. Welshofer, who has been connected with the Welshofer Ringer Metallic Company, and E. B. Bergholtz, C. C. Douglas and C. A. Anderson, formerly with the Art Metal Construction Company, will be associated with the new organization.

Heavy Hardware Merchants' Meeting

The programme has been completed for the annual meeting of the American Iron, Steel and Heavy Hardware Association, which will be held at the Hollenden Hotel, Cleveland, Ohio, May 26, 27 and 28. The meeting will start with an open session at 10 a. m. Tuesday, which will be presided over by C. M. Roehm, Roehm & Davison, Detroit, president of the association. Addresses of welcome will be made by Newton D. Baker, mayor of Cleveland, and by M. A. Black, president Cleveland Chamber of Commerce. A response will be made by E. P. Sanderson, E. P. Sanderson Company, Boston, for the active members, and by Spencer Welton, Rutherford Rubber Company, Rutherford, N. J., for the associate members. An address will also be made by Homer H. Johnson, Cleveland, representing the Chamber of Commerce of the United States of America. Various committees will be appointed during this session. Tuesday afternoon an executive session will be held to receive reports by J. G. Purdie, secretary and treasurer, and by the executive and other committees.

At an executive session Wednesday morning a paper on "The Elimination of Unreasonable and Destructive Competition" will be presented by Charles E. Faeth, Faeth Iron Company, Kansas City, Mo. The discussion that will follow will be led by L. H. Williams, Williams Hardware Company, Minneapolis, Minn.; Herbert Frela, Congdon Carpenter Company, Providence, R. I., and Charles E. Lewis, Springfield, Mass. Several committees will also report during this session. At an open session Wednesday evening a paper on "Contract Relations Between Manufacturers and Distributers" will be presented by Samuel L. Sewall, Minneapolis Iron Store Company, Minneapolis, Minn. The discussion will be led by J. P. Replogle, general sales manager Cambria Steel Company; Frank Baackes, vice-president and general sales manager American Steel & Wire Company; E. F. Yarnelle, Mossman & Yarnelle, Fort Wayne, Ind., and James A. Coe, James A. Coe Company, Newark, N. J. At an executive session Thursday morning several committees will report and a paper on "The Cost of Doing Business" will be presented by W. A. Kemmerer, Bittenbender & Co., Scranton, Pa. The business meeting will close with an open session Thursday afternoon, when officers will be elected and installed.

An elaborate entertainment programme has been prepared. This will include a dansant from 4 to 6 p. m. Tuesday, a Bal En Surprise at 9 p. m. Tuesday, a luncheon for the ladies at the Country Club followed by an automobile ride Wednesday, a musical entertainment for the ladies Wednesday evening, followed by informal dancing at the close of the men's business session, and a banquet Thursday evening.

March Iron and Steel Exports and Imports

The March report of the Bureau of Foreign and Domestic Commerce shows an increase in the total value of both the iron and steel exports and imports as compared with February. The total value of the exports of iron and steel and manufactures thereof, not including iron ore, in March was $20,551,137, as compared with $16,520,260 in February and $27,221,210 in March, 1913. Import values for March were $2,880,165 against $2,175,746 in February and $3,020,482 in March, 1913. Reducing these figures to a daily average basis for purposes of easy comparison the increase in the value of the exports was $72,931 per day, or from $590,009 in February to $662,940 in March. The average daily imports increased from $77,705 in February to $92,909 in March, or $15,204.

The exports of commodities for which quantities are given totaled 159,999 gross tons in March, as compared with 121,198 tons in February and 257,316 tons in March, 1913. All the commodities show a decline from the figures of a year ago, but the most noticeable one is in all other iron sheets and plates, which were exported to the amount of 3026 tons in March, 1913, and fell off to 490 tons in the present year. Exports of wire rods, although less than a year ago, are on the increase, having risen from 869 tons in January to 8334 tons.

Details of the exports of tonnage commodities in March and the nine months ended with March, compared with the corresponding periods of the previous fiscal year, are as follows:

Exports of Iron and Steel

	March		Nine months	
	1914 Gross tons	1913 Gross tons	1914 Gross tons	1913 Gross tons
Pig iron	11,043	28,711	164,336	223,020
Scrap	2,578	10,582	59,390	81,714
Bar iron	632	2,180	9,283	19,752
Wire rods	8,334	9,320	30,349	53,000
Steel bars	10,338	20,204	118,157	179,963
Billets, ingots and blooms	4,235	16,650	29,931	206,604
Bolts and nuts	1,640	1,842	15,474	15,181
Hoops and bands	567	2,529	8,623	13,810
Horseshoes	125	142	945	882
Cut nails	583	372	3,187	4,014
Railroad spikes	652	978	6,072	9,724
Wire nails	2,674	5,520	28,150	44,346
All other nails, including tacks	224	445	2,390	3,160
Pipes and pipe fittings	18,052	29,493	188,242	190,494
Radiators and cast-iron house-heating boilers	276	533	4,614	6,473
Steel rails	25,196	25,371	282,681	335,362
Galvanized iron sheets and plates	4,995	7,252	42,106	95,541
All other iron sheets and plates	490	3,026	8,962	25,128
Steel plates	15,256	21,996	131,663	195,350
Steel sheets	12.678	11,084	148,156	96,222
Structural iron and steel	20,550	32,065	245,813	246,155
Tin and terne plates	3,578	9,164	30,054	54,515
Barbed wire	6,165	7,025	63,548	105,390
All other wire	9,138	11,012	63,547	105,148
Totals	159,999	257,316	1,685,673	2,310,948

In March the imports of commodities for which quantities are given totaled 27,829 gross tons, against 14,308 tons in February and 27,466 tons in March, 1913. The principal changes were an increase in tin and terne plates from 200 tons a year ago to 2758 tons, and a decline in the imports of bar iron from 2673 tons to 932 tons. Details of the imports of these commodities in March and the nine months ended with March, as compared with the corresponding periods of the previous fiscal year, are as follows:

Imports of Iron and Steel

	March		Nine months	
	1914 Gross tons	1913 Gross tons	1914 Gross tons	1913 Gross tons
Pig iron (including ferro-silicon)	.....	15,628	*38,892	113,526
Ferrosilicon	659	.....	†2,049	.....
All other pig iron	10,677	.....	†52,482	.....
Scrap	5,640	4,063	26,751	29,544
Bar iron	932	2,673	18,202	21,743
Structural iron and steel	763	392	7,177	4,346
Ingots, blooms and steel billets	.....	2,143	*6,317	14,731
Steel billets without alloys	26	.....	†2,214	.....
All other steel billets	4,263	.....	†16,750	.....
Steel rails	637	467	10,422	2,921
Sheets and plates	341	349	1,843	2,858
Tin and terne plates	2,758	200	18,813	1,790
Wire rods	1,133	1,551	9,483	11,434
Totals	27,829	27,466	211,395	202,893

*Figures cover period from July 1 to October 3, 1913, inclusive.

†Figures cover period since October 3, 1913.

The imports of iron ore in March were 68,549 gross tons, against 112,574 tons in February, 101,804 tons in January and 164,865 tons in March, 1913.

The total value of the exports of iron and steel and manufactures thereof, excluding iron ore, for the nine months ended with March, was $192,179,105, as compared with $225,535,437 for the corresponding period of the previous fiscal year. The value of the imports of iron and steel and manufactures thereof, not including iron ore, for the same period was $23,200,587, against $24,313,067 for the same part of the last fiscal year.

Pig-Iron Manufacturers Meet at Chicago

The Western division of the American Pig Iron Association met at luncheon at the Union League Club, Chicago, Tuesday, May 12. Representatives from the charcoal-iron industry, two coke furnaces at Chicago, the merchant stacks at Milwaukee and Mayville, Wis., and the furnace at Duluth attended. Records were made for this district through the month of March covering the same general statistics as were developed at the New York meeting of the association. An interesting fact regarding March business was that charcoal-iron sales exceeded those made by the coke furnaces in this district.

STEEL TRADE WAGE CUTS

Why the Department of Commerce Is not Likely to Investigate

WASHINGTON, D. C., May 13, 1914.—Inquiries have been coming in to members of the House Committee on Interstate and Foreign Commerce regarding the disposition of the resolution of Representative Lobeck, of Nebraska, directing an investigation by the Department of Commerce into the facts about the meeting of independent steel manufacturers at Pittsburgh to consider the necessity of reducing the wages of their workmen. Some interesting things have developed which indicate that the Department of Commerce proposes to follow a very conservative policy in such matters. Intimations regarding this policy which have reached the committee may result in the abandonment of the resolution, which will fail of its object unless the manufacturers investigated are named in the department's report and thus made the target of the assaults of the yellow press.

Soon after the Lobeck resolution was referred, the House committee forwarded it to the Department of Commerce and inquired whether the department was in a position to make the proposed investigation. The department replied that it could make the investigation and that probably the Department of Labor could also do so should the committee desire. Supplementing this formal communication, information has reached the committee that it is the present policy of the Department of Commerce, in making such an investigation as that suggested, to broaden the scope of the inquiry so as to include the whole industry and to make its report in general terms that would not embrace details as to specific corporations, individuals, plants, etc. The department officials believe that useful and effective reports can be made regarding the operations of particular industries without disclosing individual transactions and that where the method of conducting and reporting upon an investigation is left to the discretion of the department the disclosure of the details of the business of individuals will not be made. This policy is in line with that long pursued by the Census Bureau in gathering and publishing statistics of manufacturing establishments. Where there are less than four plants in a single industry in any given State, for example, the statistics of such plants are consolidated with those of "all other industries" and thus individual operations are concealed. The figures for the industry at large, however—assuming that there are four or more plants in the United States—are published in grand totals which furnish all necessary information to persons seeking it in good faith.

The Department of Commerce will be very reluctant to undertake another investigation of the steel industry at this time, as it is only a few months since the Bureau of Corporations completed an exhaustive and very costly inquiry embracing numerous phases of the industry, in addition to the recent tendency toward consolidation. Unless Mr. Lobeck is disposed to push his resolution it is probable that the committee will make no report upon it. In view of the already overtaxed condition of the principal bureaus of the Department of Commerce and of the indisposition of the department at this time to undertake more controversial inquiries it is probable that the resolution will not be urged. An additional reason for postponing the proposed investigation indefinitely is the general impression in Congress that if the inquiry should be undertaken it would develop a state of affairs in the iron and steel industry that would present a very awkward tariff issue in the Congressional elections next November.

W. L. C.

Certain Chicago interests are endeavoring to consolidate into one company a number of the leading dealers in iron and steel scrap in Chicago, Cleveland, Youngstown, Pittsburgh, Buffalo, Philadelphia and New York. The proposed capital is $20,000,000. Much doubt is expressed as to whether anything will come of it.

Newark Foundrymen Elect Officers

At the annual meeting of the Newark Foundrymen's Association, Newark, N. J., May 6, officers for the ensuing year were elected as follows: President, H. P. Macdonald, Snead & Co. Iron Works; vice-president, James Flockhart, Maher & Flockhart; secretary, J. S. Kinne, Riverside Steel Casting Company; treasurer, John Campbell, Maher & Flockhart. Executive Committee, James Flockhart, G. Hannay, A. E. Barlow, Dennis O'Brien and Louis Sacks.

Preliminary to the election, the retiring president, G. Hannay, Oscar Barnett Foundry Company, paid a tribute to A. E. Barlow, who was about to retire as secretary, for the services he had rendered the association since its organization in 1902. Mr. Barlow has held office every year but one of the association's life. Other members spoke along similar lines, and on motion a committee was appointed to draft resolutions expressing the appreciation felt by all.

The report of the treasurer, Mr. Campbell, showed the finances to be in a satisfactory state, and Mr. Hannay recounted the work of the outgoing administration, showing that the year had been a most active one. It was voted that the association should affiliate with the New Jersey State Chamber of Commerce.

President Macdonald, in addressing the members, remarked that while this is an age of competition, business men had come to realize, through associations such as the one which the foundrymen have in Newark, that their best friends are among those of their own trade. He believed that labor troubles could best be handled through the large national organizations, but other matters were best cared for by local associations. He referred to the present time as one of depression and said that the members should take the opportunity to overhaul and increase the efficiency of their shops and further the spirit of loyalty and co-operation among foundrymen.

It was voted to give prizes of books on the metallurgy of iron and steel to those who stand at the head of the class in foundry practice at the Newark Technical School.

After the business meeting an address was given by James Wood Pogue, vice-president and managing director of the Sheldon School of Business, whose topic was "The Science of Business Building Through Man Building."

The evening was made more enjoyable by the rendition of a humorous monologue by Dewitt Paxton, who represents the Heller Brothers Company, Newark, and the Cleveland Twist Drill Company. An addition to the dinner which preceded the meeting was the presence of an orchestra. The next meeting, June 3, will be the last until next fall.

Philadelphia Foundrymen's Association

Over 50 members and guests of the Philadelphia Foundrymen's Association attended its regular monthly meeting, held at the Hotel Walton, in that city, Wednesday evening, May 6. Thomas Devlin presided and August A. Miller acted as secretary.

The committee appointed to investigate the reported unfairness in the method of awarding contracts by Philadelphia city officials reported that it was unable to find, in the specific cases referred to, any evidence to warrant the criticism, and that the association had evidently been misinformed.

Owing to the unavoidable absence of Mr. Kenneth Seaver, assistant general sales manager of the Harbison-Walker Refractories Company, Pittsburgh, who was to have addressed the meeting on "Refractories and Their Manufacture," Joseph S. Hibbs, of the J. W. Paxson Company, Philadelphia, briefly described the various lantern slides prepared to illustrate Mr. Seaver's address. These showed the mining of fire clays, its preparation by mixing and grinding, and the manufacture and burning of fire clay products. In addition, Mr. Hibbs gave extracts from an address he recently made before the Newark Foundrymen's Association, touching on the adaptability of New Jersey

clays and sands for foundry use, as well as the advantages of mica schist as a lining for cupolas.

John Murphy, instructor in foundry practice at the University of Pennsylvania, outlined features of the practical foundry instruction given students in the mechanical and electrical engineering classes. The course begins with the student's second year, and while it embraces but a few hours a week in practical work, it gives a good idea of the fundamental principles of foundry practice. J. L. Monce, instructor in pattern making in the same university, spoke briefly on the methods followed in teaching the fundamentals of pattern making.

Following the meeting luncheon was served and remarks were made by Paul Link, John Alexander, H. P. Arvenz and Walter T. MacDonald.

LIFTING MAGNETS FOR STEEL

Experience at Scotch Works in Handling Ore, Pig, and Hot Materials

At a recent meeting of the West of Scotland Iron and Steel Institute at Glasgow, H. von Kramer read a paper on "Electric Lifting Magnets and Their Application to Steel Works." He is recognized as a man with a comprehensive and intimate knowledge of the subject. In the discussion of the paper important practical points were brought out to which Mr. von Kramer replied in part as follows:

When the percentage of iron was below 60 per cent. the magnet would not attract the ore at all; above that it would lift it very much more easily. There were, of course, ores which the magnet could not move; for instance, highly silicious ore, and ores with nickel and manganese in them.

With regard to the rating of magnets when dealing with hot materials, the severest test that had been applied in that connection was to drop magnets cold into a soaking pit. They came out quite uninjured. He did not know how often they could dip a magnet in that way, but it had been left in the pit up to 30 seconds. When it was removed the hand could very comfortably be left on it.

As to the effect on the insulation of handling hot materials, a number of works handled hot pig iron and ingots of cherry red or dull red heat. As soon as the iron leaves the furnaces the magnet would not at first lift it; when the temperature of the iron fell to nearer the magnetic change point it became perfectly magnetic and could be lifted quite easily. In the magnet as designed at present there were no materials that could burn; they had all been eliminated. That was one of the reasons why some of the earlier experiments were unsuccessful. Great care was taken in the present designs to eliminate all combustible materials. This was accomplished by winding the copper in strip between asbestos tape and then insulating the whole thing by impregnating processes. This insulating compound was the only material used in the construction of the magnet which would change any of its properties under the highest temperatures that could possibly be attained inside the magnet in practice; the others would not. This point was of interest as affecting the question which had been raised of how long a magnet could be left on the circuit constantly without doing injury. In many steel works they worked right on day and night from Monday till Saturday without a stop. During this time the magnets were not given time to cool down, but made 60 to 70 trips per hour, and were kept in what could hardly be called other than constant work. The rise of the temperature inside the magnet coil was something like 300 deg. F., a temperature which might come as a shock to some electricians. But it was quite a harmless temperature, and was quite a long way off from affecting the copper or asbestos. The fact was that the heat, which was generated inside the center of the coil, took a considerable time to penetrate to the outside of the shell. Only after about 8 or 10 hr. could the heat be felt on the shell. Inside the coil the heat would be pretty high and the compound would be practically boiling. Due to this boiling the elements of which the compound was composed would, after a month or so, gradually evaporate and find their way out of the shell. They left behind a spongy mass which would not liquefy and which was a perfectly noncombustible material. With this process completed anything might be done with the magnet, generating even a great heat, as there was nothing further to burn. It is not, of course, possible to handle red hot ingots only, but ingots numbering from 10 to 20 per hour could safely be handled.

The question of the margin of safety of a magnet had been raised. When lifting its full load the magnet would raise 20 times its own weight in some diameters, down to 6 or 7 times in others. This was the maximum load a magnet could lift under test conditions. With a magnet which would lift 5 tons, in actual practice one would not go higher than a 2-ton load, or two ingots of a ton each, with a 24-in. magnet.

The point had been raised as to what effect a drop in voltage had upon the safety of the magnet. With even such a large drop as from 200 volts down to 100 volts on the supply mains the load would not drop off, though at half voltage the magnet would not raise its full load. The voltage could be reduced to an enormous degree without the load really dropping, after the magnetism had been once built up, and in this respect there was a very wide margin of safety.

The lifting of strips is still an unsolved problem. He had made tests seven years ago with 30 magnets on a bar for lifting cold strips. The problem set was to lift 90-ft. strips, and he designed an equipment consisting of a pair of bars from which the 30 magnets were suspended. Each of these magnets was composed of four small magnets, but the experiment was unsuccessful. The quantity picked up was very irregular, and a portion of the sheets peeled off, leaving a number behind which were only partly attached, which it would be impossible to transport with safety. As a result of the experience gained in the last few years it had been found that the only way to lift sheets was on edge. If sheets could be stacked on edge instead of horizontally a very small magnet which could be dropped on top would lift large quantities of sheet steel.

As to the discharging of pig iron out of ships in dock, tests had been made, and it had been ascertained that with a 42-in. magnet 60 trips per hour could be made by the crane, a load of pigs of from 12 to 15 cwt. being discharged at a time, or about 45 tons per hour. With a 52-in. magnet the rate of unloading could be increased to 60 tons per hour. These tests were made in Swansea and proved quite satisfactory. The Swansea harbor authorities have found that it was a great advantage for them to discharge by means of magnets. Owing to labor opposition to the use of magnets in docks the idea was temporarily dropped, although negotiations are now proceeding which may lead to a large installation for this work.

The plant of the National Sanitary Mfg. Company, Salem, Ohio, which went into the hands of a receiver some time ago, has been purchased by Massillon interests, represented by Louis P. Manger and Richard Johnson. The company will be reincorporated, and the plant which has been shut down will be started up within a few weeks. Later it may be moved to Massillon. Its products comprise enameled iron bath tubs, lavatories and other plumbers' sanitary ware.

In an article in *The Iron Age* for April 30 on "Manganese Flour As a Surface Hardener," a typographical error destroyed the meaning of the intended statement that gears hardened by the method described wear from 400 to 500 per cent. longer than formerly.

In the 1913 report of New York State Geologist John M. Clarke, the year's output of iron ore in the State is given as 1,606,196 gross tons, which yielded 1,217,899 gross tons of furnace ore worth $3,800,000.

The Depreciation of Factory Equipment*

A Sinking Fund Often Incorrectly Figured —The Several Things Affecting Useful Life of Apparatus—Second-Hand Value as a Factor

BY FORREST E. CARDULLO

The depreciation of a piece of property is the amount which must be set aside each year at the normal rate of interest so that when the property becomes useless for its purpose, its value will have accumulated and a new piece of property may be purchased. Before the method of computing depreciation can be made clear, it is necessary to understand the theory of sinking funds. A sinking fund is a sum of money laid aside each year at compound interest. Let us suppose that $1.00 be placed in the bank each year for 5 years at 4 per cent. compound interest. At the end of five years the first dollar will amount to $1.22, the second to $1.17, the third to $1.12, the fourth to $1.08 and the fifth to $1.04. If another dollar is paid at the end of year, $6 will have been paid in and the amount on deposit will be $6.63.

If the sinking fund accumulates for a considerable period of time, the amount of money paid in will be much less than the amount which accumulates. For instance, if $1 be deposited at the end of each of forty years, the sinking fund, if it earns 4 per cent, will amount to $95.06, although the amount paid in is only $40. If a man purchases a steam engine costing $1000, and which will last 40 years, and each year places $10.52 in the bank at 4 per cent. compound interest, he will, at the end of 40 years, have $1000 with which to replace the worn out engine. Most persons would assume that if the engine wore out in forty years the depreciation would be 2½ per cent. per year, whereas the depreciation is really a trifle over 1 per cent. The man need not put the money into the bank; he may employ it in his business and receive upon it a higher return than 4 per cent. There are easy methods of computing the amount of a sinking fund.†

USEFUL LIFE OF EQUIPMENT

The useful life of a piece of apparatus depends upon several things. Let us suppose that the piece of apparatus is a steam engine. As the engine grows older and older on account of wear, its operation becomes less satisfactory. If it receives first class care, if all the adjustments are kept in order and if no accident occurs, the engine will need no serious repairs except an occasional reboring of the cylinder, refacing of the valves and replacement of worn bearings. After these repairs have been made an old engine will operate as well as a new one.

It is likely that an ordinary type of steam engine, properly designed and receiving proper care, would operate with entire satisfaction for a hundred years if the cylinders, pistons and bearing parts were renewed at suitable intervals. There have been instances of engines continuing in satisfactory service for more than one hundred years, and engines which have been in service for forty or fifty years are very common. The depreciation of an engine which receives proper care is therefore very low, ranging from 0.1 per cent. up to perhaps 1 per cent. When an engine does not receive proper care, its period of useful life may be as low as 20 or even 15 years, in which case the depreciation becomes quite high. Engines are, however, an exceptionally long lived type of equipment, for the reason that proper repairs restore them to their original condition. In the case of some other kinds of equipment, repairs are not effective in restoring the original condition, and some definite kind of deterioration limits the period of useful life. Steam boilers, which have a useful life ranging from 15 to 30 years, according to type, are a case in point.

In the case of a boiler we can assign a definite

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*Second article on the Economics of a Manufacturing Business, the first appearing on page 1172, issue of May 7. The author is professor of mechanical engineering, New Hampshire College, Durham, N. H.

†Let S = the amount of a sinking fund on the date of the last payment; let P = the annual payment; n = the number of payments, and r = the rate of interest expressed as a decimal. We will than have the following relations among the various terms.

The number of years intervening between the first and last payments will be $n - 1$.

The amount of the last payment will be P.

The amount of the payment made the year previously will be $P(1 + r)$.

The amount of the payment made y years previously will be $P(1 + r)^y$.

From the principles of geometrical progression, the sum of the amounts of all the payments will be the sum of n terms of a geometrical series whose first term is P and whose ratio is $(1 + r)$.
This is

$$S = P\ \frac{(1 + r)^n - 1}{r}$$

In order to solve this equation readily we may write

$$\log S = \log P + \log\ [(1 + r)^n - 1] - \log r$$

In order to find the value of $\log\ [(1 + r)^n - 1]$ we must remember that

$$\log\ (1 + r)^n = n \log\ (1 + r)$$

After finding the value of $(1 + r)^n$ [i.e., the antilogarithm of $n \log\ (1 + r)$] we then find $\log\ [(1 + r)^n - 1]$.

Some examples will serve to make clear the method of computing the amount of a sinking fund, the annual payment required, and the number of years required to accumulate a given amount.

A man deposits $50 each year in a savings bank at 3½ per cent. compound interest. If he makes the first deposit on January 1, 1890, how much will he have on deposit after he makes his deposit on January 1, 1910?

The number of years elapsing between the first and last payments is 20; the number of payments or n, is 21, the rate $r = 0.035$; $(1 + r) = 1.035$ and $\log\ (1 + r) = .014940$

$$\log\ (1 + r)^n = 21 \times .014940 = .313740.$$

Then $(1 + r)^n = 2.0594$,
$(1 + r)^n - 1 = 1.0594$
and $\log\ [(1 + r)^n - 1] = .025060$

Adding	log 50 =	1.698970
we have		1.724030
Subtracting	log 0.035 =	.544068 — 2
we have	log S =	1.179962 + 2

Whence $S = \$1513.41$.

Let it be required to find the annual payment needed in order to accumulate $5000 in 20 annual payments, at 5 per cent. interest.

Here $1 + r = 1.05$ and $\log\ (1 + r) = .0211893$
Multiplying by 20 we have
$\log\ (1 + r)^n = .423786$
Whence $(1 + r)^n = 2.6533$ and $(1 + r)^n - 1 = 1.6533$

Adding	log 5000 =	3.698970
and	log r =	.698970 — 2
we have		2.397940
Subtracting	$\log\ [(1 + r)^n - 1]$ =	.218352
We have	log P =	2.179588

Whence $P = \$151.21$.

How many years will it take to retire a bond issue of $100,000 with a sinking fund of $2000 per year at 4 per cent. interest, assuming the annual payments to be made at the end of the year?

Here $1 + r = 1.04$ and

Log S =	5.000000
Adding log r =	.602060 — 2
We have	3.602060
Subtracting log P =	3.301030
We have $\log\ [(1 + r)^n - 1]$	.301030

whence $(1 + r)^n - 1 = 2$
and $(1 + r)^n = 3$.
Equating the logarithms, we have
$n \log 1.04 = \log 3$
and $n \times .017033 = .477121$
Solving for n we have

$$n = \frac{.477121}{.017033} = 28 \text{ years.}$$

cause for depreciation, namely corrosion of the plates, and the depreciation will vary in different localities, according to the quality of water employed and the care which the boiler receives. When the corrosion is so extensive that the boiler is no longer strong enough to furnish safely the pressure desired, it has reached the end of its useful life and must be disposed of either as scrap or as a second-hand boiler. A boiler originally designed for a high pressure may, however, be used with safety at a lower pressure for some time after it has reached the end of its useful life as a high-pressure boiler. This fact will have no effect upon the length of its useful life as a high-pressure boiler, but it will have some effect upon the rate of depreciation to be charged, as will appear later.

A machine tool is an example of still another kind of depreciation. As a tool grows older the ways, the gears, the threads, etc., wear away. With the lapse of time the tool becomes less and less accurate and less and less rigid. After the lapse of 10 or 15 years it is no longer capable of doing the work for which it was intended, not because it is too weak, but because it is inaccurate and rickety.

An auto truck is an example of a still different kind of depreciation. In order to keep the truck in commission it is necessary to keep it in repair and the amount of repairing which has to be done grows larger year by year. At length there will come a time when the annual cost of repairs (which includes not only the money expended for repairs, but also the losses which occur as a result of the truck being out of commission) exceeds the annual cost of a new truck. It is then time to scrap the old one.

As a last example of depreciation let us take the incandescent lamp. As it is well known, the incandescent lamp gives less and less light for a given amount of current, as its age increases. After a time, although the lamp is still capable of giving light, it is profitable to replace it, because the cost per candle-power-hour is less from a new lamp than from an old one, in spite of the fact that the early renewal of the lamp entails a higher hourly cost of operation.

Reviewing the different types of deterioration which have been outlined, we find that a few kinds of equipment, as in the case of the steam engine, are likely to outlast the industry in which they are employed. Sometimes a piece of apparatus reaches the end of its useful life because it is worn out and unable to operate at all, as in the case of a boiler, sometimes because it is so worn that it will not do satisfactory work, as in the case of a machine tool, sometimes because the cost of repairs becomes too large an item, as in the case of the auto truck, and sometimes because the loss of efficiency makes the purchase of new apparatus cheaper than the use of the old, as in the case of the electric lamp.

CONSIDERATION OF A SECOND-HAND VALUE

A great deal of equipment will have either second-hand or scrap value at the end of its useful life. A worn out engine, for instance, consists of cast iron, steel or wrought iron, and brass scrap. It has already been pointed out that a high-pressure boiler may serve many years as a low-pressure or heating boiler after it is unsafe for high pressures. A machine tool which is no longer of value to a manufacturer on account of its lack of rigidity or power may find a useful place in a job shop. A ship which is no longer seaworthy may fetch a considerable sum from an enterprising junk man, and many an auto is repaired with the parts from a wrecked or worn-out car.

Obviously, if a piece of equipment has value after it is no longer of service, the depreciation occurs not upon the original cost, but upon the difference between the original cost and the final value. It will thus be seen that the determination of the depreciation of a piece of equipment often involves the determination of its second-hand value. Since the determination of the second-hand value of a piece of equipment involves all of the elements of the cost of capital, the discussion of second-hand value will be left until later.

Depreciation is usually reckoned as a percentage of the original cost of equipment. An example will serve to make clear the method of computing it. Assume that a lathe costs $1000; that it will probably be scrapped at the end of 15 years, and its second-hand value will then be $200. We must set aside each year enough money, at, say, 4 per cent. compound interest, to accumulate a sinking fund of $800 in 15 annual payments. This will require $39.95 a year, which is very nearly 4 per cent. of the original cost of the tool. The depreciation is therefore 4 per cent. a year.

Since the second-hand value of equipment is problematical, depreciation is often computed as though it occurred upon the entire value of the equipment and not upon the difference between its original and its scrap value. Were the depreciation computed upon the entire value of the lathe in the example, it would be 5 per cent. instead of 4 per cent. It may also be pointed out that the value upon which depreciation is computed is not the cost of the equipment in the market, but its cost when set up and ready for use.

(*To be continued*)

Features of Manufacturers' Convention

The nineteenth annual convention of the National Association of Manufacturers is to be held at the Waldorf-Astoria, New York, May 19 and 20. Col. George Pope, president, will make the opening address. In addition to reports of the committees for accident prevention and workmen's compensation, fire prevention, and industrial education, will be addresses by C. W. Price, Wisconsin Industrial Commission; Professor Breckenbridge, Yale University; Edwin G. Cooley, educator; J. Schereschewsky, Public Health Department, Washington, D. C.; Robert Adamson, Fire Commissioner of New York City, and others.

Legislative issues affecting industry will be discussed by James A. Emery, and reports will be made by committees on immigration, uniform state laws and patents, etc. In the time devoted to export trade, opportunities in Russia, South American affairs, and West Africa developments will be featured in addresses by C. J. Medzikhovsky, commercial attaché to the Imperial Russian Embassy, Washington; Manuel Gonzales Z., consul general for Costa Rica in New York, and others.

A discussion of the treatment of unemployment, by representatives of establishments furnishing occupation for workmen numbered by thousands, by hundreds and also in smaller groups, is to be one of the features.

At the afternoon session of May 20 the officers and directors will be elected for the ensuing year. Among the speakers at the banquet will be Hon. Curtis Guild, former Governor of Massachusetts, and former Ambassador to Russia.

Incidental to the convention will be an exhibit devoted to the various phases of fire prevention.

An error was made in the title of an illustration in the article on "Modern Practice in Structural Shops" in *The Iron Age* of May 7. A view was given in the extensive bridge shop of the Pennsylvania Steel Company at Steelton, Pa., but instead the name of the Maryland Steel Company, Sparrows Point, Md., was used.

A CINCINNATI PROTEST

Prohibiting Exclusive Selling Agreements Would Work Hardship

(By Telegraph)

CINCINNATI, OHIO, May 12, 1914.—The Cincinnati Business Men's Association today made definite protest against the enactment into law of Section 3 of House Bill 15,657 amending the Sherman act by making the practice of exclusive selling agreements between manufacturer and middleman a misdemeanor. Business houses throughout the country, particularly the smaller concerns, are strongly opposed to this legislation. The general appeal is that representatives in Congress be given the facts in detail, that they may vote intelligently upon Section 3. The argument against its passage is ably expressed in the Cincinnati protest adopted today as follows:

"This section as it stands is in the interest of the large combines and monopolies. They do not need the middleman as do their smaller competitors. They can afford to establish their own selling organization in the various market centers; in fact, most of them now have their own selling organizations, and this section, prohibiting exclusive selling agreements, takes away the only means by which the smaller competitors of these big combines are enabled to compete with them in selling. The smaller concerns, as a rule, cannot afford to establish their own selling organizations and therefore must have the aid of the middleman.

"This section would prohibit smaller concerns from selecting an exclusive middleman representative under an exclusive arrangement. They would have to sell to all middlemen, which would mean indifferent and inefficient representation in competition with the bigger concern with its direct selling organization. When all middlemen may handle identical product, then no middleman takes any special interest in it.

"Under the present method of exclusive selling arrangements there is ample competition between the various middlemen for the benefit of the consumer. Each middleman is fighting every other middleman in the interest of his exclusive line. If the exclusive agency arrangement is abolished and the manufacturer must sell all middlemen, who in turn must sell all competing makes of the same article, then economy and efficiency in selling are destroyed and selling expenses greatly increased; for this would mean that the middleman must maintain larger stocks, larger warehouses greater number of salesmen, etc. These increased expenses must ultimately be paid by the consumer.

"The 'exclusive agency agreement' method of sale is very widely employed today in all the various channels of business. Certain makes of shoes, hats, clothes, tobaccos, foods, manufacturing supplies, automobiles, etc., are handled exclusively by certain middlemen. A provision, therefore, which makes this arrangement a misdemeanor under the Sherman act, if enacted in the law, would bring about a very wide disturbance of existing business methods. All of this seems unnecessary and unwise, inasmuch as the 'exclusive agency' method of sale as practiced today does not in any way act in restraint of trade or of full competition for the benefit of the consumer."

The steamer Howard M. Hanna, Jr., was launched May 9 at the Cleveland yards of the American Shipbuilding Company. Its dimensions are 525 ft. over all, 54 ft. beam and 30 ft. deep, with a capacity of 9000 tons, being somewhat larger than the boat bearing the same name, which was lost in the storm last November. The vessel will be operated by W. C. Richardson & Co.

An Export Transaction in Scales

The Standard Scale & Supply Company, Pittsburgh, Pa., reports an interesting export transaction in scales. The Government of Uruguay, needing scales for its new Montevideo customs house, requested bids from leading manufacturers in Europe and America. The specifications called for 15 scales of the heavy railroad pattern, wagon type, 20 tons capacity, each equipped with a Reed recording beam; a number of metal portable scales with beams incased in iron boxes, known as freight-house scales, also special suspended overhead-tramway scales for weighing movable loads. The Standard Scale & Supply Company secured the contract, amounting to $17,000, and received a bonus of $5 per day for each day that it made delivery earlier than three months from the date of awarding the contract. This is particularly noteworthy, in view of the fact that the scales had to be transported 6000 miles and that the time required for their delivery was only six weeks. The company has been very successful in building up an export trade in scales and has thus established an international reputation.

New Open-Hearth Steel Plant at Wheatland

Some time ago W. W. Shilling, president of the Sharon Foundry Company, Sharon, Pa., secured an option on about 100 acres of land at Wheatland, Pa. This has been taken over by the Sharon Steel Hoop Company, which now operates an open-hearth steel plant, blooming and finishing mills at Sharon. It is the intention of the Hoop Company to build on the site thus acquired an open-hearth steel plant to contain six 70-ton furnaces and a blooming mill. While it will continue to operate its present plant at Sharon, it is probable that all future extensions will be made at the new plant at Wheatland. When the new steel plant is completed it is the intention to ship blooms to the present plant at Sharon, where they will be reheated and rolled into finished products. No contracts have as yet been placed, but it is the intention to start work on the new plant at an early date.

Western Reserve Steel Company

Interests identified with the Sykes Metal Lath Roofing Company, Niles, Ohio, manufacturer of Sykes trough, sheet lath and expanded cup lath, have organized a new company to be known as the Western Reserve Steel Company, which has secured a site of 60 acres at Warren, Ohio, and proposes to erect a new plant to contain six hot sheet mills, three cold rolling mills, galvanizing department with three galvanizing pots, also a sheet metal department, which will manufacture all styles of formed roofings and sidings. The company has a capital stock of $600,000, and C. G. Thomas, now with the Sykes Metal Lath & Roofing Company, will be president. Later on the Western Reserve Steel Company will absorb the Sykes Metal Lath & Roofing Company. Work on the building of the plant will be started as soon as possible, and contracts for the equipment are expected to be let in the near future.

The Delaware & Hudson has ordered 15 consolidation and 10 Pacific type locomotives from the American Locomotive Company. The Chicago & Northwestern is in the market for 15 Pacific type and 25 mikado type locomotives.

An unfortunate typographical error on page 1178 of the issue of *The Iron Age* of May 7 placed Bruning in New York instead of Nebraska. The item referred to pumping equipment needed for waterworks.

The Case Crane & Engineering Company, Columbus, Ohio, has re-elected Paul T. Morton president and general manager. Although the company is but one year old it has already enlarged its plant.

PERSONAL

At the meeting of the Council of the International Association for Testing Materials lately held in Turin Robert W. Hunt, of Robert W. Hunt & Co., engineers, Chicago, was selected as one of the vice-presidents of the association.

G. H. Charls, general manager of sales, American Rolling Mill Company, Middletown, Ohio, has returned from a three months' business trip to Europe.

W. S. Dickson, Cincinnati, Ohio, sailed from New York May 11 on an extended business trip to Europe. He will represent the Cincinnati Planer Company and Acme Machine Tool Company, both of Cincinnati.

Azor R. Hunt, who recently resigned as general superintendent of the Homestead works of the Carnegie Steel Company, Homestead, Pa., was a guest at a dinner given by the Superintendents' Club at the Carnegie Hotel, Homestead. He was presented with a steel engraving, and short addresses were made by A. C. Dinkey, president Carnegie Steel Company, and others.

The Committee of Science and Arts of the Franklin Institute, Philadelphia, has awarded the Edward Longstreet medal of merit with diploma to Herbert T. Herr of Pittsburgh, for recent developments of the steam turbine. Mr. Herr has been vice-president and general manager of the Westinghouse Machine Company, East Pittsburgh, for some years, in which time he has been instrumental in bringing about many improvements in the turbine. He is also the inventor of a pneumatic ship control by which the captain of a vessel is enabled to control from the bridge the operation of the engines, and has brought out a new rotary valve gasoline engine for automobiles.

C. E. Bertie has been transferred from the Chicago office of Rogers, Brown & Co., to their Philadelphia office, with which he was formerly connected.

Robert M. Keeney, electrometallurgist of the Bureau of Mines, has resigned, to take charge of the construction of a 100-ton cyanide plant, tramway and power house for the Baker Mines Company at Cornucopia, Ore.

Dr. Leo H. Bakeland will be the first lecturer in the Chandler Foundation, Friday afternoon, May 29, on the occasion of the celebration of the 50th anniversary of the founding of the School of Mines of Columbia University.

Prof. R. H. Fernald, of the University of Pennsylvania, has been appointed a consulting engineer of the Bureau of Mines in its general technological investigations. He will go to Europe to investigate and report on certain improvements in connection with gas producers in metallurgical and power operations.

The Pennsylvania Steel Company at its annual meeting, held May 11, created the office of chairman, which is to be filled by William H. Donner, now president of the Cambria Steel Company. Mr. Donner was elected a director of the company recently to fill the vacancy caused by the death of George F. Baer.

W. D. Jacoway has resigned as superintendent of the Lackawanna Steel Company's No. 2 open-hearth plant at Buffalo, in which duplexing has been carried out so successfully in connection with two large tilting furnaces. He goes to Australia as open-hearth superintendent of the new steel plant under construction by the Broken Hill Proprietary Company, Ltd., at Newcastle, New South Wales. He sails from San Francisco May 28.

E. L. Kessel, manager of the Vulcaan Company, Antwerp, the export company of the Thyssen Steel Works, Mülheim a. d. Ruhr, Germany, who has been in the United States for a number of weeks, sailed from New York for Antwerp this week. Accompanying Mr. Kessel to this country was K. N. Kluguvitz, who remains in New York in the steel sales department of Mecke & Co., 24 State street, the American representatives of the Thyssen Steel Works.

F. W. Koehler has resigned as a director of the Sharon Steel Hoop Company, Sharon, Pa.

James Kernan, for more than 40 years assistant secretary and assistant treasurer of the Bethlehem Steel Company, South Bethlehem, Pa., has retired from active duty. W. F. Hartman and A. N. Roberts have been appointed to the two positions which Mr. Kernan had filled alone.

Fritz Brose, representing the John Muir & Co. interests, has been elected a director of the Vulcan Detinning Company. Oswald Lamason was elected secretary of the company in place of Frank E. Spier, and other officers were re-elected.

William Lodge, president Lodge & Shipley Machine Tool Company, Cincinnati, is announced as the principal speaker on the occasion of the organization on May 14 of the Engineers' Club of Dayton, which is to establish itself in a clubhouse at Second and Madison streets, Dayton, Ohio.

Directors Dr. Bruno Bruhn and Dr. Karl Wendt of the Fried. Krupp Aktiengesellschaft, Essen, Germany, are spending their vacation in the United States and in the next few weeks will visit a number of representative steel plants.

Newark Technical School Ends Year

Among the graduates of the Newark Technical School, Newark, N. J., whose exercises were held May 11, were four men employed in local foundries who had finished the course in foundry practice. This course was formed at the suggestion of the Newark Foundrymen's Association five years ago and is conducted by George Heggie, who is also connected with the Stevens Institute, Hoboken. The class is intended for working molders and pattern makers who aspire to higher positions. The graduates were addressed by Judge Thomas A. Davis, Orange, N. J.; Charles A. Colton, who has been director of the school since it started in 1885, and others. The Newark Foundrymen's Association presented prizes to John J. Hewitt and Timothy J. Buckley, who had the highest percentages in the foundry class. The other members were Samuel McQuire and F. R. Muir. The total number of graduates in all classes was 33, the largest in the history of the school.

The Trumbull Steel Company, Warren, Ohio, has placed a number of contracts for its plant extensions. United Engineering & Foundry Company, Youngstown, will furnish 10 hot mills—consisting of six 30-in. sheet mills and four 26-in. tin mills—and five cold-rolling mills. The William Tod Company, Youngstown, will install a 3000-hp. tandem compound condensing engine, 34 x 68 x 60 in., Helander condenser and gear drives for electrically driven cold rolls. The Morgan Engineering Company, Alliance, will furnish four traveling cranes; the Babcock & Wilcox Company, four 500-hp. boilers; the Murphy Iron Works, Detroit, stokers, and the Dempsey-Degener Company, Pittsburgh, coal and ash handling equipment. A contract for a 1000-hp. turbine and generator and a motor for driving the cold rolls will be placed shortly.

The American Iron and Steel Institute has distributed among its members a complete list of the membership, with business connections. The names are given by States, with an alphabetical arrangement of cities, and following the State lists is an alphabetical list of the entire membership. The total is 1189. There are 14 honorary members, five each in the United States and England and one each in Germany, France, Belgium and Italy.

The Carnahan Tin Plate & Sheet Company, Canton, Ohio, has appointed Ambrose Beard & Son, 1532 Dime Bank Building, Detroit, selling agents in the State of Michigan and in part of Ohio and Indiana. A. J. Maskrey is now general superintendent of the company's works. The products are high grade steel sheets for automobile work and special enameling, blue polished sheets, and tin and terne plate.

Pittsburgh and Nearby Districts

The monthly meeting of the Pittsburgh Foundrymen's Association was held at the Fort Pitt Hotel on Monday, May 11, preceded by a dinner. The meeting was devoted to a discussion of operating problems in a brass foundry, lead by S. D. Sleeth, for many years superintendent of the foundries of the Westinghouse Air Brake Company, Wilmerding, Pa.

The Cyclops Foundry Company, Monongahela, Pa., has arranged to erect a foundry to replace the one destroyed by fire January 2. It is expected to be in operation by July 1. The new foundry will be electrically operated throughout. It will be equipped with a 10-ton Case electric crane. The plant will include a pattern shop and machine shop. It will make gray-iron castings up to 12 tons. The company maintains an office in the Union Bank Building, Pittsburgh.

The Greenville Steel Car Company, Greenville, Pa., has been running 10-hour day shifts and 12-hour night shifts for some weeks, and is now employing 200 more men than it did six months ago.

The Petroleum Iron Works Company, Sharon, Pa., maker of steel plate work, is extending its power house 40 ft., to make room for two air compressors, a new engine and a 150-kw. generator. It has been working night and day turns for some time. As its present power plant is being worked to full capacity continuously, and a portion of the time overloaded, it is found necessary to provide more equipment.

The report that the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., had bought land at Oakland, Cal., on which to build a new plant to supply its Pacific coast trade, is officially denied.

The Connellsville Central Coke Company, Pittsburgh, which operates about 500 ovens in the lower Connellsville region, recently notified its employees of a reduction of about 7 per cent. in wages to become effective May 1, putting the rates back to those in force in 1911. The employees refused to accept the reduction and went out on a strike.

The stockholders of the New Castle Steel & Iron Company, New Castle, Pa., will meet in the general offices in the Farmers' Bank Building, Pittsburgh, May 27, for the purpose of voting on an increase in the capital stock of the company from $400,000 to $550,000. Of the proposed new capital 4000 shares will be common stock and 1500 shares will be preferred 7 per cent. cumulative.

The United States Government has approved plans of the Jones & Laughlin Steel Company for a concrete dock wall on the Monongahela River, Pittsburgh, between South Twenty-second street and the bridge of the Monongahela Connecting Railway. The wall will be 1000 ft. long, 24 ft. thick at the base and 4 ft. thick at the top. It is designed to be built in sections.

Two of the Westinghouse-Melville reduction gears for use in reducing the high speed of turbine engines aboard battleships for general utility have just been ordered from the Westinghouse Machine Company, East Pittsburgh, each with a capacity of 500 hp., and for installation on battleship No. 39 now building. It is understood that the power that will be transmitted through these gears will be used in operating the various lighting arrangements for the ship and for moving hoists and other small power-driven equipment.

The Riter-Conley Mfg. Company, Pittsburgh, has received a contract from the Cedar Rapids Mfg. & Power Company, Massena, N. Y., for galvanized river crossing towers for shipment to Cedars, Quebec, Ont., and Massena, N. Y., taking about 250 tons of material; for about 20 oil tanks of 55,000 bbl. capacity each for shipment to the Cushing oil fields in Oklahoma, in which about 4000 tons of plates will be used; from the Pennsylvania Railroad for a steel bridge at North Philadelphia, 325 tons, and from the same road for a trough floor bridge at West Brownsville, Pa., 150 tons; from the Electric Bond & Share Company, New York City, for its Oneida development in Utah, about 300 tons of surge tank work.

The Ohio & Pennsylvania Railroad, with a capital of $500,000, has been authorized to build a short industrial line to connect the works of the Youngstown Sheet & Tube Company with the Mary furnace of the Ohio Iron & Steel Company at Lowellville, Ohio. The road will be about three miles long. Nearly all the pig iron made at Mary furnace is used by the Sheet & Tube Company.

One furnace of the La Belle Iron Works, Steubenville, Ohio, which was running on basic iron, was blown out last week on account of the depression in the steel trade, leaving one stack in blast.

The Carnegie Steel Company has built and equipped a hospital at its Farrell works at a cost of about $15,000.

Harrisburg Pipe & Pipe Bending Company

An adjourned meeting of the stockholders of the Harrisburg Pipe & Pipe Bending Company was held on Thursday, May 7, and the old board of directors, consisting of J. Hervey Patton, E. Z. Wallower, David E. Tracy, W. P. Starkey and W. T. Hildrup, Jr., were re-elected. At a directors' meeting following, Mr. Patton tendered his resignation of the presidency and David E. Tracy, formerly general superintendent, was elected president. E. Z. Wallower was elected vice-president; W. T. Hildrup, Jr., general manager, treasurer and secretary, and W. P. Starkey, formerly assistant general superintendent and chief engineer, was elected general superintendent and chief engineer. Mr. Tracy recently resigned from the Board of Public Works to devote more attention to the business of the Harrisburg Pipe & Pipe Bending Company. Mr. Starkey, in the past year designed and supervised the erection of a new universal mill for the company (described in *The Iron Age* of November 13, 1913), which owing to special features of design has attracted the attention of mill engineers.

The general manager, Mr. Hildrup, reported to the board of directors that while there had been a decided slackening in new orders, which he attributed to unwise legislation, the company still had quite a tonnage of unfilled orders and that contract tonnage was being freely specified. He expressed the opinion that in the near future there would be a decided increase in demand for the products of the company.

A Record Blast Furnace Run

The Pittsburgh Crucible Steel Company blew out its blast furnace at Midland, Pa., April 30, after what is believed to be a record run of 7 years, 7 months and 24 days on its original lining. It was blown in September 6, 1906, by the Midland Steel Company and was taken over by the Pittsburgh Crucible Steel Company March 1, 1911. The total output of pig iron was 1,053,673 gross tons, nearly all basic metal. The original bell and hopper were still in service and in good condition when the furnace was blown out, after more than 3,500,000 gross tons of stock had passed over them, and they will be used again when the furnace blows in. By patching the brickwork at the stock line and for a short distance below, it would have been possible to continue the furnace blast for a longer period, but the company thought it best to blow out now during the depression in the steel business in order to reline and increase the dimensions of the stack. The entire output is used in the open-hearth plant of the Pittsburgh Crucible Steel Company at Midland. The original rated capacity of the furnace was 400 to 450 tons a day, but after it has been relined it is expected that from 500 to 550 tons a day will be produced.

At the annual meeting of the German Foundrymen's Association in Berlin June 3 to 7, one of the papers will be by W. Pleuger on "Practical Experiments in German and Austrian Iron Foundries, with Some Observations on American Foundries."

Book Reviews

The Law of Patents for Designs. By William L. Symons, lecturer on the law of trademarks and patents for designs, Washington College of Law, Washington, D. C. Pages 134, 6 x 9 in. Published by John Byrne & Co., Washington, D. C. Price $3.

The book refers to the different United States statutes which have been passed from time to time as a basis for design patents, and explains the present statutes and the meaning of a number of their important terms. There is a full discussion of the character of designs on which design patents are granted to protect the characteristic contour or appearance of articles of manufacture. The scope of such design patents is made clearer by references to mechanical patents which are based on the function or operation of the different parts of the article or machine, and also by reference to copyright protection for designs relating to paintings and other works of art.

Another chapter covers the amount and character of the changes which are required to render a design patentable, and the combination and adaptation of various design elements as distinguished from merely adding together old features taken from other articles. The standard and tests of patentable novelty in designs is clearly explained as based on the general appearance of the entire article to the average purchaser, which is also the test of improper imitation or infringement of a patented design. This is brought out by illustrations taken from a number of the judicial decisions.

The last part of the book relates especially to applications for design patents and their prosecution in the United States Patent Office, including the different technical requirements, on which the author speaks with peculiar authority because for a number of years he has been a patent examiner who has been acting on design applications. For these reasons the book is a very valuable reference work for those who are interested in design patents or design applications; and designing and constructing engineers in manufacturing lines will also find the general discussions valuable, especially in view of the increasing importance of design patents in their lines of work.

Machinery's Handbook. Pages, 1400, 7¼ x 2¼ in.; leather, gilt edges. Published by The Industrial Press, New York. First edition, 1914. Price $5.

Few technical students leave school with any idea of how much assistance a good handbook is to the busy technical man. In the first few months out of college they are often surprised by the ease and rapidity with which the practical man, who they know has had very little education, solves problems in the solution of which they would cover many sheets of paper with a maze of figures. Gradually they also begin to use handbooks, first for mathematical tables, later for formulas and strength of materials. But it is not until they have made one or two mistakes that they realize that all handbook information cannot be taken blindly.

Most of the handbooks on the market have been compiled by engineers from the data they have collected from time to time, partly their own experience and partly from miscellaneous sources. In a similar way Machinery has been collecting material for twenty years. There are few machinist reference files in the country that do not contain some of the data published by Machinery. Now we find the best of this collected in this handbook. While there are already many good handbooks, this one is especially for the machine shop. About half of the book is devoted strictly to the operation and design of machine tools. The book does not have a thumb index nor is the table of contents grouped for quick reference, but the index in the back of the book is very complete.

About 300 pages in the first part of the book covers mathematics. The powers and roots of numbers are given from 0.01 up to 2000, followed by the squares of mixed numbers, tables of volumes and areas. Prime numbers are followed by ratio and proportion, and thus on through algebra, geometry, trigonometry and mechanics, covering the formulas and tables most likely to be needed in the shop or drawing room. Weights and measures and the metric system are not included in this mathematical group but are in the latter part of the book. Under the strength of materials and stresses in various machine parts, the economical design of various sections to resist given loads is covered, including moments of inertia and moduli of these sections. Riveted joints are also included and torsional strength of shafts, and the strength of wire and wire rope.

In the design of machine parts the book has a most condensed and complete treatise on gearing, in which spur, bevel, worm, spiral, herringbone and epicyclic gearing are treated individually. In fact, there are over 50 pages on this subject. Bearings and clutches, friction brakes, springs and cam design are covered, as well as the smaller details of machines down to the keys, bolts and wrenches. The work on springs deserves special mention. The machine shop toolroom men will be interested in the parts devoted to shop tools and tool room supplies, drills and reamers, taps and dies, milling cutters and forming tools, while the general machinist and his apprentice will find the work on machine shop practice highly instructive, as the different operation and best practice are outlined from the kind of tools and lubricants for machine operations on through the various stages, to allowances made for running, shrinking and forcing fits and the instruments and gauges for measuring the work. Machine drives are included, with chapters on belts and other means of transmitting power, including horsepower of machine tools and the troubles of electric motors and dynamos.

The metallurgy of iron and steel contained in book covers forge shop and foundry practice, various methods of welding, die, punch and press work, with valuable information on heat treatment of different grades of steel. Some 90 pages are devoted to those subjects.

The remainder of the book embraces miscellaneous information, such as heat, compressed air, hydraulics and piping, lutes and cements, and closes with some points on plant appraisal, drawing room practice and patent law. The arrangement of chapters might be improved in places and if supplemented by a thumb index would make the book more convenient to use.

Electrical Welding of Pipe

A patent (U. S. 1,093,010—April 14, 1914) has been granted to Elias E. Ries, electrical engineer, 116 Nassau street, New York, for a method of manufacturing metal pipe and tubing. The invention is intended to do away with the intermittent character of some methods of manufacture whereby the skelp must be reheated for bending and then reheated for welding. By the new process the skelp is immediately passed to the bending rolls whereby its initial heat is taken advantage of; from these it passes through a specially designed electric welding apparatus which imparts sufficient heat to weld the metal into pipe. Speed is an important factor in doing away with the necessity of losing much of the initial heat of the billet and the success of the process. As the skelp emerges from the bending rolls specially designed electric apparatus supplies the requisite heat to the meeting edges of the traveling tube at a number of separate points to raise it to the welding temperature. The heated edges are then brought together under pressure so as to form a welded joint or seam. The three-pole electric contact system is used instead of the two-pole, and a large saving of electric energy is claimed. A point advanced in favor of the process is the absence of undue heating of the metal and of the incorporation of scale or oxide in the joint, as well as a lessening of the pitting and scale due to repeated heating of the metal. The inventor claims to be able to make any desired gauge or diameter at a reasonable cost.

At the monthly meeting of the Bridge Builders & Structural Society, held in Pittsburgh, May 8, it was shown from careful reports collected by its secretary that during the month of April 88 per cent. of the entire capacity of the bridge and structural shops of the country was contracted for.

The Machinery Markets

Dullness in the machinery trade is widespread, though there are bright spots in New York, Chicago and Detroit. In the first-named city a little improvement in sentiment has been noticed, though business is still poor, while in Detroit and Chicago the week brought an improvement in single tool orders. The machine tool demand in particular is indifferent generally. Prices have been cut in New England in the effort to reduce stocks. Cleveland sees no indications of any early improvement, with the quiet extending in all directions. The export demand as well as other buying is unsatisfactory in Cincinnati and some slowing up of foundry operations is seen. Inquiries are light in Detroit, but they cover a great variety of equipment. The inactivity in woodworking machinery in this city is marked. The past ten days brought out more spotty, irregular business in Chicago than has been experienced for some time. The market for machinery in general is dragging in Milwaukee. Conditions in the central South are irregular and boiler manufacturers have cut down their working hours. Conservatism in buying continues in St. Louis. In the Southern States there is considerable activity in the establishment of small ice plants, and agricultural equipment is in good demand, but other lines are reported dull in Birmingham. Machine tools are moving poorly on the Pacific coast and prices have suffered, but in some other lines some improvement has been felt in San Francisco.

New York

NEW YORK, May 13, 1914.

With the majority of the trade there is a better sentiment, based in some instances on a slight improvement in business and in others by a conviction that the freight rate decision will not be much longer deferred. It is said by firms who deal largely with the railroads that more interest is being shown in shop specialties by purchasing agents and that sales are somewhat more numerous. There has been considerable inquiry for hoisting and conveying machinery, and the amount of information gathered indicates busy times for this line when general activity is resumed. This applies also to cranes. It continues to be noticed that various manufacturing lines are more than ordinarily busy, and it is pointed out that any other condition would be strange in a country of this size and consuming capacity. Activity in machine tools is scarcely fair, but the hopes of the trade are strong. What is being felt most is the absence of equipment orders for new shops.

The Peters Brothers Mfg. Company, Buffalo, N. Y., has been incorporated to manufacture hardware, cutlery, small farm implements, etc. A. E. Holt, A. A. Hoesterman, 1352 Jefferson street, and G. M. Church, Buffalo, are the incorporators. The capital stock is $25,000.

The Hyoline Cement Company, Buffalo, is building a three-story factory at Erie avenue and Zimmerman street, North Tonawanda, N. Y.

The Interstate Hydrostat Company, Buffalo, was recently incorporated to manufacture and sell engines, boilers, electrical machinery and supplies for machine shops. It will equip a plant for the purpose. G. A. Lenhard, Detroit; C. F. Sherwood, Buffalo, and others, are the incorporators. The capital stock is $200,000.

The Modern Railway Appliance Company, Albany, N. Y., has been incorporated and will establish a machine shop and foundry for the manufacture of railroad appliances. The capital stock is $20,000. W. V. and C. A. Simmons, 245 North Pearl street, Albany, and others, are the incorporators.

The Enameled Steel Package Corporation, Avon, N. Y., has been incorporated with a capitalization of $700,000 to manufacture enameled steel packing cases and containers. J. A. Cowles, J. H. Charity and H. R. Allen, Rochester, are the incorporators.

The Burroughs Cyclecar Company, Ripley, N. Y., has been incorporated with a capital stock of $30,000 by J. W. Burrows, R. P. Burrows and Robert Burrows to manufacture cyclecars and novelties. The company already owns a factory, fully equipped.

The Wegman Piano Company, Auburn, N. Y., is in the market for all kinds of wood-working machinery, suitable for use in piano manufacturing. P. C. Shurman is general manager.

The Geneva Cutlery Company, Geneva, N. Y., manufacturer of razors, shears, etc., is building an addition to its factory to cost $5000, to be used as a finishing and case making department.

The item which appeared in *The Iron Age* of April 30 stating that the pumping station of the Mount Morris Water Company, Mount Morris, N. Y., has been destroyed by fire was erroneous. The property burned was a small plant belonging to the Pennsylvania Railroad Company.

W. D. Worthington, city clerk, Mt. Pleasant, N. Y., will receive bids until May 19, for one steam fire pump.

The village clerk, Sidney, N. Y., will receive bids about July 1 for constructing a waterworks at an estimated cost of $125,000.

New England

BOSTON, MASS., May 12, 1914.

Business with the local machinery builders and dealers continues dull. The stocks of machine tools have decreased in the past year. The manufacturers have made every effort to get rid of superfluous investment in completed machines and their parts, with the result that prices have been sacrificed in a good many cases, though the lists remain unchanged. Observers regard with pleasure the excellent crop reports. Collections are not as satisfactory as might be wished.

John Becker has retired from the management of the Becker Milling Machine Company, Hyde Park, Mass., and the office has been assumed by his son, John Becker, Jr., who has been assistant to the manager for several years.

The Locke Steel Belt Company, Bridgeport, Conn., manufacturer of tempered steel detachable sprocket chain and attachments, has patented and placed on the market a machine for straightening band steel, the function of which is to do away with troubles resulting from side bends. The machine takes the place of the very long and powerful drawbench, which the company had previously regarded as the only available method which would meet the conditions.

The Mead-Morrison Mfg. Company, Boston, Mass., builder of coal and ore handling equipment, will erect an additional building at the plant in East Boston, recently occupied. The structure will be used as a pattern shop and will be 50 x 80 ft. In the not distant future a foundry building will be constructed. The new buildings will be strictly fireproof, following out the ideas already inaugurated in the existing structures, which comprise a large machine shop and erecting plant, a plate shop, power house and office building.

The New Britain Machine Company, New Britain, Conn., has increased its capital from $600,000 to $800,000.

The town of Mansfield, Mass., has voted to issue $75,000 of bonds for improvements to its waterworks. The estimated cost of some of the items is as follows: Boiler room and fittings, $2000; new boiler and fittings, $2000; pumping engine and foundation, $11,000.

The American Woolen Company will increase its mill at Madison, Me., by adding a story to a building and extending it 50 ft. The Hamilton Corporation, Lowell, Mass., plans to erect an additional mill this spring to cost $50,000. C. J. Nickerson, South Attleboro, Mass., manufacturing jeweler, is planning to build an addition to his factory.

Philadelphia

PHILADELPHIA, PA., May 12, 1914.

George B. Allen, Brooks street, Media, Pa., is rebuilding his two-story brick and concrete factory at an estimated cost of $20,000. Walter Smedley, Stephen Girard Building, Philadelphia, is the architect.

The American Viscose Company, Marcus Hook, Pa., is building an addition to its factory.

The Camden Copper Works, 559 South Second street, Camden, N. J., manufacturer of copper, brass and iron work, is building a factory 40 x 50 ft., three stories.

The Monarch Engineering & Mfg. Company, Baltimore, Md., manufacturer of furnaces, etc., is in the market for the following materials for delivery at Curtis Bay: One set of power-driven sheet plate rolls for plate bending, with clearance between housings of not less than 6 ft. 2 in. for rolling sheet up to ⅜-in. thick, diameter of upper roller presumably 8 in. and lower roller 10 in.; one 25 to 50-lb. helve hammer for blacksmith shop, equipped both for foot power or with motor drive, 115 volts, 25 cycles.

The town of Rockville, Md., has been authorized to issue $50,000 of bonds for the construction of a sewerage system.

The citizens of Kensington, Md., have voted $50,000 of bonds for the construction of water and sewerage system.

The State Legislature has authorized the city of Mt. Ranier, Md., to issue $125,000 of bonds for the installation of a water and sewerage system and an electric lighting plant. The issue has been approved by the voters and plans are being prepared.

Chicago

CHICAGO, ILL., May 11, 1914.

If one is drawing fine lines of distinction, it is certainly possible to say that orders for machine tools have been more plentiful in the past 10 days than for a long time, but there is no great cause for general jubilation as the business has been very spotty and has seemed to move in grooves. The requirements of the Commonwealth Edison Company for its repair shop at the Fisk street station, Chicago, are of local interest. The company is buying three lathes and a shaper with individual motor drive at an aggregate outlay in the neighborhood of $5000. The proposal of the Pere Marquette Railroad to provide for the necessary expenditures by issuing receivers' certificates is being watched as a possible forerunner to the purchase of machine equipment the road has needed for a long time.

The Automatic Fender Mfg. Company, Chicago, has been organized with a capital stock of $20,000 to manufacture auto supplies and safety devices. The company was incorporated by Peter Napier, Robert Fidler and John Manning, 143 North Dearborn street.

The Atlantic Sales Company, Chicago, incorporated with a capital of $5000 by Frank B. Kemper, Kurt Hardt and Fred C. Hoeppner, Hammond, Ind., will manufacture machinery, tools and novelties.

The Altizer Elevator Company, Chicago, has been incorporated with a capital of $25,000, to manufacture elevators and hoisting machinery, by J. P. Altizer and others. The present address of the company is 609 LaSalle street.

The Harrington Interlocked Collapsible Vault Company, Chicago, has been organized with a capital of $10,000 to manufacture a special type of vault by James J. Harrington, Jr., 945 Galt avenue.

The Pennsylvania Railroad has purchased a site at Whiting, Ind., (Chicago suburb) on which railroad yards will be constructed and repair shops built.

The Celfor Tool Company, Railway Exchange Building, Chicago, the increase in whose capital stock has already been mentioned, has made announcement of plans for building a $100,000 addition to its plant at Buchanan, Mich.

The Illinois Modern Button & Machine Company, 507 West Jackson boulevard, Chicago, has purchased a site on Ogden avenue, upon which a four-story factory will be built at a cost of $35,000.

The Victor Lead Storage Battery Company, Rock Island, Ill., has been incorporated with a capital stock of $100,000 by E. E. Winters, G. E. Brown and W. E. Snider.

The Shimer Steel & Wire Company, Evansville, Ind., announces its intention to begin the construction of a $100,000 wire mill addition to its plant within 60 days.

L. A. Larson, Duluth, Minn., consulting engineer, has prepared plans for municipal power and heating plant for the city of Hibbing, Minn., which it is proposed to install at an aggregate cost of $265,000.

The Lakey Foundry & Machine Company, Muskegon, Mich., whose organization has been mentioned, will specialize in saw mill machinery and motor castings. Otto G. Meeske is president.

The town of Paton, Iowa, has voted bonds for the purchase of an electric lighting system.

The Skinner Mfg. Company, Omaha, Neb., will build a factory at an estimated cost of $150,000.

The town of Effingham, Kan., has voted $12,000 of bonds for the installation of an electric light system.

Milwaukee

MILWAUKEE, WIS., May 11, 1914.

May business thus far has not been encouraging. Tool bookings continue fair, but without feature. Other machinery is slow and the market is dragging. Comparisons of present business in general with that of a year ago show a decided falling off. Labor conditions in all lines of industry are quiet, but the industrial commission's April report shows a slight improvement over March.

The Standard Separator Company, 274 Reed street, Milwaukee, will be ready for bids after May 20 for the construction of its plant in West Allis. Work is to start June 1. The main building will be of steel and brick construction, 150 x 200 ft., two stories, and will include offices and power plant. Klug & Smith, Mack Block, Milwaukee, are the architects and supervising engineers.

The board of water commissioners, Monroe, Wis., rejected all bids for a new pumping engine for the waterworks system and will readvertise for tenders.

The Rock County board, Janesville, Wis., appropriated $1500 for the installation of new boilers in the courthouse.

The South Side Machine & Auto Company, capital stock $15,000, has been organized at Clintonville, Wis., by William Splittgerber, Frank Ebert and Arthur Peotter.

The new plant of the Wisconsin Machinery & Mfg. Company, Milwaukee, on Burnham street, West Allis, is now under roof. The main building is 75 x 150 ft. and the power plant 50 x 50 ft., all of steel and brick. The site is 4½ acres, allowing sufficient room for liberal extensions as demanded. The company builds valveless marine engines and rowboat motors. Jesse W. Otto is secretary.

The Lipman Air Appliance Company, Beloit, Wis., the incorporation of which was noted recently, is distinct from the Lipman Mfg. Company, of Beloit, although Carl E. Lipman is the principal factor in both organizations. The new corporation, capitalized at $100,000, will engage in the manufacture of patented air pumps and appliances designed by Mr. Lipman, while the Lipman Mfg. Company will continue to manufacture general machinery. The air appliance business is an outgrowth of the old concern's operations.

The waterworks project to be undertaken by the city of Colfax, Wis., will require one 15-hp. geared

base oil engine, pump and accessories. A. T. Thompson, Chippewa Falls, Wis., is consulting engineer. C. A. Kenney is city clerk.

A complete waterworks and sewerage system will be constructed by the Kohler Mfg. Company, Sheboygan, Wis., in the hamlet of Kohler, the seat of the company's extensive enameling works. Walter J. Kohler, the president, is in charge.

F. J. Meloinek, Beloit, Wis., is building a machine and boiler shop, to be equipped with welding and cutting apparatus and equipment for general gas engine and machinery work.

The Hartford Tire Pump Company, Hartford, Wis., the incorporation of which was recently noted, has leased quarters and is installing equipment for the production of air-compressing appliances for automobiles. W. Heston Knickerbocker is general manager.

O. H. Schultz, H. J. Schuerbrock and H. L. Kuehnel, all of Milwaukee, have organized the Excelsior Mixer & Machinery Company, with $25,000 capital, to engage in the production of concrete construction equipment.

The Wausau Sulphate Fiber Company, Wausau, Wis., is about to make important extensions and improvements to its plant at Mosinee, Wis. Another unit will be added to the power plant and the paper-making facilities will be greatly enlarged.

The Beloit Nickel Plating & Mfg. Company, Beloit, Wis., has purchased the former Beloit Creamery Company's factory, St. Paul avenue, and will quadruple its capacity. It will also make an installation of welding and cutting apparatus.

The DePere Civic Association, DePere, Wis., has practically completed its canvass for $25,000 in stock subscriptions to induce the Milwaukee Cycle Car Company, 513 First avenue, Milwaukee, Wis., to locate its plant in DePere.

The Weyher Wagon Works, Black River Falls, Wis., has been incorporated by E. T. Weyher and E. G. Heideman. The capital stock is $25,000. It will enlarge its works and install considerable new machinery.

The LaCrosse Steel & Construction Company, LaCrosse, Wis., has been organized with $15,000 capital by George W. Trayer, J. F. McDonough and Fred A. Phifer. The company will engage in general construction work, specializing in steel erection.

Indianapolis

INDIANAPOLIS, IND., May 11, 1914.

The Century Electric Company, Indianapolis, has voted an increase of capital stock from $6000 to $25,000, in order to enlarge its factory. V. E. Nicholson is president.

The Modern Jam Dolly Company, Indianapolis, has been incorporated with $10,000 capital stock, to manufacture tools. The directors are A. M. Bristor, W. B. Waddell and W. A. Bristor.

The Vacuum Peeler Company, Indianapolis, has been incorporated with $100,000 capital stock, to manufacture fruit peeling machinery. The directors are C. E. Wood, W. F. Werbe and L. Geiger.

The Meier Electric & Elevator Company, Indianapolis, has changed its name to the Meier Electric & Machine Company.

The Central Lumber & Mill Company, Hammond, Ind., has been incorporated with $100,000 capital stock, to do a manufacturing lumber business. The directors are T. P. Walworth, E. G. and M. H. Walworth.

The Sullivan County Concrete Tie Company, Sullivan, Ind., has been incorporated with $100,000 capital stock, to manufacture ties and building material. The directors are J. J. Parker, Max Crowder and Edgar T. Allen.

The Anderson Button Machine Company, Anderson, Ind., has been incorporated with $10,000 capital stock to manufacture shoe-button attaching machines. The directors are A. E. Tolin, F. R. Brown and F. J. Fadely.

The South Bend Malleable Iron Works, South Bend, Ind., has filed notice of dissolution.

Bids will be received by the board of works, Ft. Wayne, Ind., for the construction of a new lighting plant and installation of a traveling crane.

The Harmony Piano Company, Evansville, Ind., has been incorporated with $30,000 capital stock to manufacture musical instruments. The directors are W. C. Prickett, Herbert Leich and J. F. Beams.

Chapin & Co., Hammond, Ind., millers, are building an addition to their plant at an estimated cost of $12,000.

Cleveland

CLEVELAND, OHIO, May 11, 1914.

The machinery market continues extremely dull, with no indications of an early improvement. Dealers are booking few orders for more than one tool, and even single tool orders are light. They are quoting prices on some small lots of machines, but in most cases the placing of orders for these is held up until conditions improve. This prospective business should make the market fairly active as soon as general conditions make a decided turn for the better. The demand for cranes and other lines of industrial plant equipment is light and the same is true of electrical equipment. Second-hand machinery is also quiet. Conditions in the foundry trade show little change. Some foundries are running at about 75 per cent. of capacity, but the majority are less fortunately situated.

Bids will be received by the commissioner of purchases, Cleveland, May 20, for a motor-driven 4-in. centrifugal pump and a steam-turbine-driven 10-in. centrifugal pump for the City Hospital and a motor-driven submerged bilge pump for the municipal electric light plant. The city of Cleveland will also purchase shortly two steam-driven hydraulic pumps, two motor-driven hydraulic pumps, all of 5 gal. per min. capacity, with 5000 lb. pressure, one 1⅜ x 2 ft. 6 in. hydraulic cumulator, one turbine tube cleaner, one motor-driven air compressor with a capacity of 100 cu. ft. per min. and two grate mixers.

The Safety & Savings Gas Appliance Company, Lorain, Ohio, recently formed to manufacture a valve for automatically controlling the gas supply for stoves, has been incorporated with a capital stock of $50,000, by W. E. Knight, J. H. Braddon, and others. The company will establish a plant at Broadway and Seventeenth street.

The village of Archbold, Ohio, will install a waterworks system and has voted a $15,000 bond issue for that purpose.

The Acme Die & Stamping Company, Urbana, Ohio, has been incorporated with a capital stock of $10,000 by Charles H. Keener, Lincoln Burnham, and others, to manufacture tools and dies. The company is practically a reorganization of the Urbana Engineering Company. It will probably add some new equipment.

The John Knapp Sons Foundry Company, Akron, Ohio, has been incorporated with a capital stock of $50,000. The foundry is at present being operated by the Knapp Brothers on Switzer avenue, Akron.

The Toledo Aluminum Company, Toledo, Ohio, has been incorporated with a capital stock of $5000 by Wm. H. Bell, and others.

The Miller Metal Works Company, Toledo, Ohio, a new concern, has placed orders for considerable machine-shop equipment, including power presses, lathes, shapers and some other machine tools.

The Urschel-Bates Valve Bag Company, Toledo, Ohio, will shortly begin the erection of a new factory building, 90 x 112 ft., two stories. It will be of brick, steel and concrete construction.

The Zahner Metal Sash & Door Company, Canton, Ohio, has been incorporated with a capital stock of $2000 by T. H. McGowan, F. M. Murphy, M. M. Dietrick, and others.

The city of Canal Dover, Ohio, plans a sewerage disposal plant to cost $40,000.

Sealed proposals will be received by the director of public service, New Philadelphia, Ohio, until noon, May 21, for furnishing a sewerage disposal works to cost about $25,000.

The committee on finance and waterworks, city of Columbus, Ohio, has approved the appropriation of $125,000 for the purchase of a storage pumping unit for the water pumping plant.

Cincinnati

CINCINNATI, OHIO, May 11, 1914.

With very few exceptions, reports from machine-tool builders are unsatisfactory. Last week was very dull, with little business in sight. The majority of manufacturers and business men here are impatient over the delay in settling the railroad rate question, many believing that any sort of decision would put an end to the suspense and start things moving. Dealers in both new and second-hand machinery have also had a slow week. Boiler and tank makers report a little more business in sight, but prospective customers are slow in closing. A number of ice plants are under construction and contemplated in the South and Southwest, and these will require considerable equipment that nearby firms expect to sell. As a rule, the jobbing foundries report a slackening in activities, but the melt has not appreciably declined as compared with the last report. In all lines the export business is slow, although a few orders from both England and Japan have been received lately. The German trade is very dull.

The Bourne-Fuller Company, Cleveland, Ohio, has purchased the plant of the Globe Rolling Mill Company, Smith and Front streets, Cincinnati. The company's Cincinnati office has been located in this building for several years. No changes will be made in the present arrangements.

The Ault & Wiborg Company, Cincinnati, paint and varnish manufacturer, contemplates making some extensions to its plant in Norwood. Power plant and other equipment will be required.

The Coca Cola Bottling Works, Cincinnati, has tentative plans under way for a building to be constructed on a site recently secured at 475 Pioneer street. No details are yet available as to the equipment that will be required.

The R. K. LeBlond Machine Tool Company, Cincinnati, will make an addition to its plant that will be 20 x 90 ft., two stories. Practically all of the necessary equipment will be of the company's own manufacture.

The Pettibone Mfg. Company, Cincinnati, will make an addition to its power plant for which a boiler will be required.

The Sanitary Laundry Company, Covington, Ky., will install an additional boiler in its plant.

Elder & Hendry, 118 Yale avenue, Columbus, Ohio, are having constructed a foundry plant that will have a daily capacity of 10 tons of gray-iron castings.

The Superior Tool Company, Wheeling, W. Va., has made arrangements to move its plant to Cambridge, Ohio. It is understood that its manufacturing facilities will be increased.

The American Tool & Mfg. Company, Urbana, Ohio, was recently formed by P. J. Schneider and H. P. Creighton, to manufacture special machine-shop tools.

The Springfield Railway Company, Springfield, Ohio, has awarded contract for its proposed car barns and shops to the W. W. Lindsay Company, Philadelphia, Pa.

The Kitchen Cabinet Mfg. Company, Evansville, Ind., has had plans prepared for a large addition to its plant that will more than double its capacity.

Birmingham

BIRMINGHAM, ALA., May 11, 1914.

There is a healthy demand from rural consumers for small engines and a good trade with users of cotton and oil mill equipment. Considerable activity in the establishing of small ice factories in Alabama and adjoining states stimulates demands in that particular. Otherwise conditions are quiet.

S. M. Holtzinger, W. L. Adams, and others, are the incorporators of the Pine & Cypress Mfg. Company, Birmingham, Ala. The capital stock is $30,000, and it is proposed to manufacture lumber.

The Planters' Oil Company, Albany, Ga., will rebuild the cotton-seed oil mill recently burned with a loss of $35,000.

The Cotton States Seed & Fertilizer Company, Macon, Ga., has been incorporated with a capital stock of $200,000 by Joel Hurt, W. M. Hutchinson and G. C. Stevenson, of Atlanta, Ga. It will manufacture fertilizers and cotton-seed products.

The Farmers' Product Company, West Point, Ga., contemplates establishing a cotton-seed oil mill. J. C. McKenzie is secretary and treasurer.

The La Grange Foundry & Machine Company, La Grange, Ga., has been incorporated with a capital stock of $5000 with privilege to increase to $100,000. A foundry and machine shop are to be established. I. N. Lozier, who is largely interested, will be general manager.

McCormick & Fahy, Rome, Ga., have been commissioned to prepare plans for a municipal electric lighting plant for the city of Carrollton, Ga.

The city of Apopka, Fla., will build a small electric lighting plant.

Tatum Brothers, Miami, Fla., will build a power plant to operate an electric street railway.

Arrangements for the installation of a municipal electric light plant for the city of Micanopy, Fla., have been made.

The Universal Plow Company, Florence, S. C., will increase its capital stock from $40,000 to $100,000 for the purpose of adding to its manufacturing capacity. It will install a bulldozer, taper roll, riveters and additional drills. J. A. Huggins is general manager.

Detroit

DETROIT, MICH., May 11, 1914.

Business has shown a slight betterment the past week, caused principally by an increased volume of single tool transactions. No large sales were reported, however, and there are no indications that continued activity may be looked for. Inquiries are light but cover a considerable variety of equipment. Conditions among manufacturers are in the main fairly satisfactory; some report additions being made to operating forces and generally a fair run of orders is being received. One noticeable feature of the local market is the inactivity in wood-working machinery; second-hand equipment is also in poor demand. Foundries continue to operate on an even basis. Building interests are active.

The New Standard Foundry Company, Detroit, has been incorporated with a capital stock of $50,000 to operate a foundry. Bernard Stroh, Bernard Stroh, Jr., and Edwin Stroh are the incorporators.

The Ford Motor Company, Detroit, states that the report which has been current in the daily press that the company has purchased a tract of 65 acres in Detroit preparatory to the erection of a plant for the manufacture of electric automobiles is incorrect. The company has done some experimental work on electric car models but no factory is planned at present.

The M. E. Wood Company, Detroit, has been awarded the contract for the new foundry building which the American Malleable Company will erect at Owosso, Mich. The plant will be 68 x 168 ft.

The Columbia Brass Company, Detroit, has been organized with $30,000 capital stock to manufacture brass goods. The incorporators are Milton A. McRae, Jr., Reuben E. Stone and Roy V. McRae.

Edwin Denby, Detroit, has purchased three power sites near Clintonville, Mich., and proposes to organize a company to operate an electric lighting plant.

The Western Brass & Aluminum Company, Detroit, has been incorporated with $3000 capital stock to manufacture special castings. The incorporators are John Schultz, George Szostecki and Andrew Chlanda.

The Riverside Foundry Company, Kalamazoo, Mich., has increased its capital stock from $10,000 to $50,000.

The Valley City Milling Company, Grand Rapids, Mich., will bond for $140,000 to provide for improvements. The company will erect a meal manufacturing mill and install a considerable amount of additional machinery in its present mills.

The Gile Boat & Engine Company, Ludington, Mich., has additions to its plant under way which will greatly increase its capacity. The new buildings

are 50 x 100 ft. and 30 x 165 ft. respectively, the former to be used as an addition to the present foundry and the latter as a testing and stockroom. A sand blast room and a grinding room are also being erected.

The plant of the Darling Milling Company, Fremont, Mich., was destroyed by fire May 8, entailing a loss of $50,000.

The city of Midland, Mich., will erect a waterworks plant to cost $40,000.

The foundry plant of Carroll Bros., Houghton, Mich., the largest in the upper peninsula, was destroyed by fire May 6. The loss is heavy. No information as to rebuilding is yet available.

Plans are being made for the installation of an electric light plant for the town of Unionville, Mich., to cost about $8000.

The Welch Mfg. Company, Sparta, Mich., manufacturer of wardrobes, showcases, etc., is building an addition, 30 x 200 ft., for its cabinet making and finishing department. No machinery is required at the present time.

The Denton Furniture Company, St. Joseph, Mich., has been incorporated with $15,000 capital stock to manufacture furniture and is equipping a plant. Herbert Denton and William J. Dahlke are the principal stockholders.

The Central South

LOUISVILLE, KY., May 11, 1914.

Rather irregular conditions are reported in this territory. While the industrial situation generally is quiet, which is reflected in a light demand for boilers and special equipment, agricultural conditions, especially in the cotton country, are good, and are developing an excellent demand for general equipment, especially for small lighting plants and other public utilities. The boiler men are particularly discouraged with the state of their trade, and are working short time, though the leading plants have had to cut down only about an hour a day. Ice machine builders, who had a great year in 1913, say that things are not nearly up to normal this time. Oil engines are moving well, and are being used in connection with small lighting plants in a large part of this section. Building operations are slack, and this, together with the fact that the railroads are not buying, is having a bad effect on a good many lines of machinery.

Now that natural gas is obtainable in Louisville at a low price, there seems to be an excellent opportunity for the sale of gas engines of the proper type. In the case of the Falls City Buggy Top Company, Louisville, which has purchased a gas engine from the Goetz-Coleman Mfg. Company, New Albany, Ind., it replaced an electric motor.

Fairbanks, Morse & Co., Louisville, have been doing an excellent business of late. They sold an oil engine, generator and storage battery to M. F. Cheek, Taylorsville, Ky., for use in an electric light plant; an oil engine and electrical equipment to Houser & Burnett, who are putting in a plant at Mt. Eden, Ky., and a municipal electric light plant to Birdseye, Ind.

The Chess & Wymond Company, Louisville, is buying equipment for a stave finishing plant to be operated at East Sylamore, Ark.

The American Laundry Company, Louisville, is planning the installation of an automatic stoker. George Mercke is manager.

The W. H. Gillette Mfg. Company, Louisville, which makes vehicle wood stock, is to construct a forge department, and will erect an addition to its plant which will be 60 x 60 ft. Punches, shears and other metal-working equipment will be needed.

The Bennett Seating Company, formerly of Cincinnati, has now located in Louisville, and has leased a factory at 537 West Market street. It is in the market for a pony planer, and will probably need other wood-working equipment later.

The Bouvier Specialty Company, 801 West Main street, Louisville, has taken bids on a reinforced concrete factory and will purchase additional equipment for it a little later on.

The Brunswick Creosoting Company, Louisville, is now constructing its plant and in about four weeks will take bids on a full line of equipment, including cylinders, pumps, etc. The estimated cost is $150,000. It is located at Brunswick, Ga., but all of the equipment will be purchased here.

Powell Barlow and Ray Moore, Glasgow, Ky., will erect a factory for the production of twist tobacco. The equipment will be purchased in the immediate future.

W. M. Hutchens, Elizabethtown, Ky., is in the market for additional equipment for a flour mill.

O. H. Boltz, Irvine, Ky., is to establish a brick and cement block factory with a capacity of 10,000 bricks a day.

The Jackson Lumber & Supply Company, Jackson, Ky., has been chartered with $100,000 capital stock and will erect a sawmill, it is reported. W. E. Minter and C. L. Rice, Kenova, W. Va., are among the incorporators. A West Virginia charter was secured.

The plans for the service plant of the Illinois Central Railroad at Memphis, Tenn., now being drawn by A. S. Baldwin, chief engineer, Chicago, require the installation of boilers for heating, light and power purposes. The estimated cost is $50,000.

The Green River Lumber Company, Memphis, Tenn., will construct a bandmill. Power and special equipment will be needed.

City Engineer Weatherford, Memphis, Tenn., has advised that plans for a pumping plant to be established on the North Memphis levee are ready for bidders.

The city of Nashville, Tenn., is to purchase a boiler. Address the city commissioners.

The American Hame & Singletree Company, Chattanooga, Tenn., advises that it is now ready to purchase equipment. A. T. Holzbog is general manager.

The Chickamauga Cement & Lime Company, Chattanooga, Tenn., is in the market for considerable stone crushing equipment.

St. Louis

ST. LOUIS, MO., May 11, 1914.

The machine tool market continues depressingly dull. The situation is one of almost absolutely no business, but there are no reports in the hands of the dealers that give any tangible reason for the situation, save that the sentimental state of mind which exists is responsible rather than lack of money for enterprises. Crop reports, etc., are of the most favorable character and the dealers appear confident that there will be a change of sentiment before long. Second-hand tools are as hard to move as new, and therefore add no feature to the dull gray of the present moment. Collections are reported good and in all other ways the foundation of things is seemingly healthy.

E. R. Kinsey, president board of public improvements, St. Louis, Mo., will receive bids until noon of May 19, for furnishing and installing three wash water pumps, two pressure pumps, two chemical solution pumps with motors, controlling apparatus, etc.

The American Churn Mfg. Company, St. Louis, has been incorporated with a capital stock of $75,000 by M. H. and L. A. Crossman and Glenn Jones to manufacture dairy implements and creamery equipment.

The National Co-operative Drug Company, Wright Building, St. Louis, has leased a factory and will equip a manufacturing and compounding plant.

The Automatic Vacuum Exhauster & Heating Company, St. Louis, has been incorporated with a capital stock of $50,000 by F. E. Siebenmann, W. C. McNutt and J. R. Clancy to manufacture a patented exhauster.

The Knobnoster Brick, Tile & Power Company, Knobnoster, Mo., of which C. A. Harrison is president, and C. D. Middleton, manager, will install additional kilns and electrical equipment.

A franchise for the equipment of a waterworks plant at Clarksville, Mo., has been granted to A. Vogel, Louisiana, Mo.

The Louisburg Ice Company, Louisburg, Mo., will equip a 6-ton ice plant. A. A. Moore, L. B. Montgomery and Perry Marsh are interested.

The Bunceton Ice & Fuel Company, Bunceton, Mo., has been incorporated with a capital stock of $15,000 by R. F. Wyan, and others, and will install a 10-ton ice plant.

A 12-ton ice plant will be erected at Branson, Mo., by H. A. Larson, Council Bluffs, Iowa.

An electric light plant to cost about $30,000 will be installed at Palmyra, Mo., under the supervision of F. D. Martin, Rialto Building, Kansas City, Mo.

The Liberal Brick & Stone Company, Sugar Creek, Mo., of which B. F. Lambert, Anderson, Ind., is president, will install a brick plant and shale crushing equipment.

The Varner Furniture Company, St. Joseph, Mo., which is building a factory, as previously noted, will probably be in the market for some machinery when the building is completed.

The Freeo Valley Canning Company, Fruit Ridge, Ark., of which J. A. Hawks, Holly Ridge, Ark., is secretary, is in the market for canning equipment of 10,000 cans daily capacity.

The Columbia Cotton Oil Company, Magnolia, Ark., will replace its present equipment with a 60-ton plant, the machinery to cost about $8000. W. W. Boyd is manager.

The Plainview Light Company, Plainview, Ark., has been incorporated with a capital stock of $10,000 by W. W. Winters, Danville, Ark., and others, and will install equipment to cost about $5000 under the direction of H. C. Miller, the engineer.

A factory for the manufacture of a machine to cut rice in the fields will be erected by G. I. Dill & Son, Harrisburg, Ark.

The city of Paragould, Ark., will expend about $30,000 on the improvement of its waterworks plant, including an additional pump and power plant.

The chair stock factory at Benton, Ark., to be established by T. Manning, Womble, Ark., will require about $3000 of machinery.

The Purdue Cooper Chair Plant, Malvern, Ark., has been leased by R. E. and H. A. Van Deusen, who will install new equipment and otherwise remodel it for the manufacture of cross-banding, tanks, drawer bottoms, etc.

The Anderson Mfg. Company, Owasso street and Admiral boulevard, Tulsa, Okla., has been incorporated with a capital stock of $50,000 by J. M. and S. C. Clover and J. W. Marshall, and is reported in the market for galvanizing equipment and machinery for welding steel barrels.

J. S. Fetherstone, Enid, Okla., will equip an automobile garage and repair shop and is in the market for the necessary tools.

J. H. Jackson, Lake Carrier, Miss., is in the market for equipment for a factory for the manufacture of handles.

The Calcasieu Motor Car Company, Lake Charles La., will equip a repair shop and is in the market for machinery.

The United Electric Mfg. Company, New Orleans, La., has been incorporated with a capital stock of $100,000 by W. P. Conery, L. C. Reed, and others, to manufacture electrical apparatus.

The J. W. Thompson Gravel Company, Walls, La., will increase the capacity of its gravel recovery plant at Fort Allen, La., by adding equipment for handling 100 cars per day.

F. S. Shields, New Orleans, La., will receive bids until June 17 for one 15-ton hand operated crane.

Texas

AUSTIN, TEXAS, May 9, 1914.

John A. Cummins, Oklahoma City, Okla., general state sales manager of Oklahoma for the Maxwell Motor Sales Corporation, Detroit, is authority for the statement that it is contemplating the erection of a branch factory at Dallas.

Fitch & Nix, Corpus Christi, are planning the construction of a waterworks system for the city, and to irrigate 7500 acres of land. Pumping machinery will be required.

The Texas Power & Light Company, Dallas, has taken over the light and power plant of the City Electric Company, Belton. Extensive improvements will be made.

Bids will shortly be asked for the construction of a sewerage disposal and filtration plant for the city of Dallas, Texas, for which plans have been prepared by James H. Fuertes, 140 Nassau street, New York City, the engineer.

The Cotulla Ice & Power Company, Cotulla, is erecting an electric light plant. It is also contemplating the erection of a pre-cooling plant.

William Lobstein, Santa Anna, will erect a small ice plant.

Work has been resumed on the improvement and enlargement of the power plant at San Angelo. More than $150,000 will be expended by J. D. Sugg, the owner.

The city council, Longview, will erect a waterworks on the Sabine River.

San Francisco

SAN FRANCISCO, CAL., May 5, 1914.

Nearly all lines of machinery are quiet, some being extremely dull while others show slight signs of improvement. The machine-tool department is one of the worst, as several expected inquiries have failed to materialize, and even the small trade has been dragging for the last week. What little business is placed is at very low prices, and collections are dragging badly. The local demand for foundry and shop supplies shows hardly any improvement. Some dealers in wood-working machinery report good orders within the last few days, and with most California mills in operation the outlook in this line is more encouraging, though a good deal of business may hang fire for some time. Offerings of second-hand equipment of many kinds interfere with new business to an appreciable extent. There is considerable inquiry in a general way, but buyers are inclined to wait.

The principal machine-tool inquiry up this week is for the Oakland manual training high school, and includes nine lathes, a milling machine, a drill press, a grinder and a lot of accessories.

The Sacramento Foundry & Machine Company, Sacramento, Cal., has been incorporated with a capital stock of $250,000 by J. H. Stephens, J. H. Peterson, R. F. Urquhart, I. J. Trainor and H. J. Humber. It is a consolidation of the Globe Iron Works and the Sacramento Pump Company.

The Union Tool Company, Los Angeles, has started work on an addition to its main building 105 x 300 ft., to accommodate the new Diesel engine department.

A. W. Cretsinger, Los Angeles, has applied for a permit to use certain parcels of harbor land at Los Angeles for machine shops, foundries, etc.

The Electric Orchard Igniter Company, Pomona, Cal., incorporated at $50,000, is preparing to start a shop to manufacture a heater-igniting device.

The Pacific Canning Machinery Company, Los Angeles, has been incorporated with a capital stock of $24,000, by J. R. Colburn, Jr., W. E. Privett and J. E. Stephens. It will open a shop for the manufacture of patented canning devices.

The city of Sacramento, Cal., has sold $9,600 of bonds to cover the purchase of the first unit in the municipal lighting plant.

The erection of a pumping station in district No. 1, Orville, Cal., has been ordered.

The city of Los Angeles is taking bids for a hoisting engine and boiler.

The Phoenix Machine & Cold Storage Company, Mesa, Ariz., has been incorporated with a capital of $50,000, by H. Thalheimer, P. T. Hurley, S. J. Tribolet and others, to deal in refrigerating machinery. It will install an electric light plant.

The Standard Oil Company, Richmond, Cal., will start work shortly on a water filtration and sterilizing plant at its refinery, to cost about $100,000.

The Western Galvanized Iron Mfg. Company, Long Beach, Cal., has been incorporated with a capital stock of $75,000 by S. T. Wolfe, W. H. Bennett, C. W. Cunningham, G. A. Boden and P. M. Welsh.

The Pacific Northwest

SEATTLE, WASH., May 4, 1914.

If plans now under consideration prove satisfactory the plant of the Winans-Kracht Piano Mfg. Company, Tacoma, will locate in Seattle. The capital stock of the company is to be increased by $100,000, to be used in extensions and improvements to double its present capacity. W. F. Kracht and W. M. Wilson are in charge.

The Beatson Copper Company, Seattle, has begun the construction of a $250,000 concentrating plant, with a daily capacity of 500 tons, on Latouche Island, Alaska. The machinery required will probably be purchased from Seattle dealers.

The planing mill of the Hellieson Lumber Company, North Yakima, Wash., was recently destroyed by fire, causing a loss of about $35,000. H. M. Helliesen, Seattle, the president, states the plant will be rebuilt.

The plants of the Washington Excelsior Works and Puget Veneer Company, Edmonds, Wash., were recently burned, entailing a loss of more than $50,000. J. L. Taylor manager of the former, states that his company will immediately rebuild, and it is stated that the Puget Veneer Company will also do so.

The Automatic Current Motor Company, Spokane, has been incorporated with a capital stock of $250,000. O. W. Watson, Edgar Watson, E. G. Watson, Clifford Rinear are the incorporators.

Land on both sides of the Columbia River, near Wenatchee, Wash., has been purchased by representatives of the Chicago, Milwaukee & St. Paul Railway, and a large dam will be constructed across the river about 15 miles below Beverly, where it is authentically reported a large power plant will be built for use in electrifying the company's lines in this section.

The Mt. Vernon Marble & Granite Works, Mt. Vernon, Wash., has purchased another site and will at once remove its plant. At the same time it will make considerable improvements and enlarge its manufacturing capacity.

Public Works Commissioner Woods, Tacoma, Wash., is now receiving bids for the construction of a municipal cold storage plant which is estimated to cost $20,000. The date of closing bids has not been set.

The U. S. Reclamation Service, Great Falls, Mont., of which J. M. Fine is mechanical engineer, is having plans prepared for development of power at the second drop of the Huntley project, to supplement the present pumping plant at the last drop. Considerable new machinery will be required.

The saw mill of the Minam Lumber Company, Minam, Ore., was recently destroyed by fire. Manager Goff states it will be at once rebuilt.

The Eagle Brewing Company, Juneau, Alaska, will construct a four-story concrete and timber brewery and office building. It also contemplates extensive improvements to the present plant.

A. J. Dodd, E. Wagner, F. S. Garrett, of Coulee City, Wash., are a committee in charge of building a creamery. The necessary stock has been subscribed, and it is expected that construction will start soon.

The Oregon & California Railroad Company, a subsidiary of the Southern Pacific Company, has purchased a site in Springfield, Ore., on which it expects to erect a large machine shop.

The town of Drain, Ore., has authorized the construction of an electric light plant and has voted $15,000 to cover the cost.

Receiver Ferris, of the Idaho-Oregon Light & Power Company, Boise, Idaho, has secured permission from the Federal Court to continue the construction of the 5000-hp. Oxbow power plant on the Snake River, near Boise. He will spend $220,000 in completing the plant. Over $1,000,000 has already been spent on this project, and it is planned at a later date to construct a dam and develop 32,000 hp.

The city of Plentywood, Mont., will use about $20,000 of its recently voted $32,000 bond issue for the construction of a system of waterworks and sewers. Plans are being prepared by the city engineer.

Plans and specifications for a water system for the city of Umatilla, Ore., have been completed by Louis C. Kelsey, Selling Building, Portland, Ore. The plans call for a deep well triplex pump and an oil engine. About $20,000 will be expended.

The citizens of Three Forks, Mont., have voted $45,000 of bonds for waterworks purposes.

Eastern Canada

TORONTO, ONT., May 9, 1914.

The Abitibi Pulp Company is continuing the construction of the pulp mill at Iroquois Falls, Ont., and will also begin work on a paper mill, which, it is expected, will be in operation by July, 1915, and will have a capacity of 65,000 tons of newsprint paper a year.

The ratepayers of Waterloo, Ont., passed a by-law to loan the Globe Furniture Company $50,000 for 20 years, and to grant it exemption from taxation for 10 years. In return the company will make large additions to its plant to cost $125,000.

The ratepayers of Little Current, Ont., have passed a by-law to grant $12,000 for an electric plant.

The Nagrella Mfg. Company's plant at Emerald and Shaw streets, Hamilton, Ont., was destroyed by fire with a loss estimated at about $25,000.

The ratepayers of Sandwich, Ont., have passed a by-law to loan $35,000 to the Canadian Alkali Company, which will erect a factory.

The Polson Dry Dock & Shipbuilding Company, Ltd., Toronto, has been incorporated with a capital stock of $2,000,000 by James Stewart, William Gilchrist, M. Aylesworth, and others, to carry on the business of founders, smiths, etc., and to build ships, vessels, etc.

The Dominion Office Supply Company, Ltd., Walkerville, Ont., has been incorporated with a capital stock of $25,000 by G. G. Kuhlman, F. C. Ledyard, and others, to manufacture office furniture.

A. Barnet & Co., Ltd., Renfrew, Ont., has been incorporated with a capital stock of $250,000 by Alexander Barnet, J. E. H. Barnet, and others, to manufacture furniture, etc.

The Canadian Laco-Philips Company, Ltd., Montreal, has been incorporated with a capital stock of $25,000 by J. S. Lovell, William Bain, Robert Gowans, and others, of Toronto, Ont., to manufacture electrical and other machinery.

The Federal Paper Company, Ltd., Montreal, has been incorporated with a capital stock of $100,000 by J. J. Meagher, H. N. Chauvin, of Montreal; P. W. Peacock, of Westmount, Que., and others, to manufacture pulp and kindred materials.

The Automatic Chemical Sprinkler Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by G. A. Robinson, G. F. Clare, A. G. Moore, and others, to manufacture sprinkler appliances, etc.

The South America Cabinet Woods, Ltd., Toronto, has been incorporated with a capital stock of $1,000,000 by C. J. F. Collier, H. F. Welsh, and others, to manufacture articles in which wood or timber is required.

The Canadian Zagelmeyer Company, Ltd., Windsor, Ont., has been incorporated with a capital stock of $30,000 by L. H. Walker, Adam Kolb, and others, to manufacture molds for making cement blocks, etc.

The Canadian Breweries, Ltd., Toronto, has been incorporated with a capital stock of $3,000,000 by J. A. Rowland, D. H. Stewart, N. D. Tyler, and others, to carry on the business of brewers, distillers and maltsters.

The William Beatty Lands & Timber Company, Ltd., Parry Sound, Ont., has been incorporated with a capital stock of $100,000 by W. J. Beatty, and others, to manufacture lumber, pulpwood, etc.

The Pneumatic Wheel Company, Ltd., Toronto, has been incorporated with a capital stock of $200,000 by C. F. Ritchie, J. H. Oldham, W. J. Beaton, and others, to manufacture automobiles, cycles, motor engines, etc.

The McEachern Tie & Timber Company, Ltd., Thessalon, Ont., has been incorporated with a capital stock of $40,000 by E. S. Perryman, J. A. McEachern, and others, to operate sawmills and to manufacture articles from wood.

Western Canada

WINNIPEG, MAN., May 8, 1914.

Gilbert Hunt, Walla Walla., Wash., has signed a contract with the municipality of Dauntless, Alta., to erect a large plant for the manufacture of threshing machines, feed grinders and other farm implements. The industry, which is to be known as the Dominion Harvester Company, will supply parts for repairs as well as new machines. The plant will cost about $750,000. Building operations will commence shortly.

J. E. Conley, Memphis, Tenn., president of the Conley Frog & Switch Works, is making preparations for the erection of a frog and switch plant to be situated between the cities of Ft. William and Port Arthur, Ont.

The J. H. Tabor Candy Company, Medicine Hat, Alta., will commence building operations at once on the erection of a factory. It will represent an outlay of about $50,000. J. H. Tabor will be managing director.

Government Purchases

WASHINGTON, D. C., May 11, 1914.

Bids will be received by the paymaster general, Navy Department, Washington, on May 12, for the following supplies: Schedule 6633, yards and docks, class 3, bid A, for two 20-hp. vertical fire-tube boilers for Mare Island; bid B, for the same for San Francisco; bid C, for the same, f.o.b. works. Schedule 6634, construction and repair, class 11, for four hoists for Puget Sound; alternate bid for the same, f.o.b. works. Schedule 6673, steam engineering, class 101, for blading material for Curtis turbines for New York. Schedule 6696, steam engineering, class 181, for 18 pumps for Norfolk. Until May 19, schedule 6637, steam engineering, class 1, bid A, for one refrigerating plant for the U. S. S. Maumee, at Mare Island; bid B, for the same, f.o.b. works. Schedule 6638, steam engineering class 2, for one motor-driven, screw-cutting, back-geared engine lathe, with spare parts, for Mare Island; alternate bid for the same, f.o.b. works; class 3, for one motor-driven toolroom column shaper spare part for Mare Island; alternate bid for the same, f.o.b. works; class 4, for one motor-driven upright drill press for Mare Island, and alternate bid for the same, f.o.b. works; class 5, for one motor-driven double emery grinder and spare parts for Mare Island; alternate bid for the same, f.o.b. works.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until May 19, for furnishing the following materials: Schedule 6689, yards and docks, class 11, for two 20-hp. boilers for Portsmouth. Schedule 6690, construction and repair, class 21, for four centrifugal pumps for Philadelphia. Schedule 6691, construction and repair, class 22, for one motor-driven 36-in. band sawing machine for Brooklyn, and alternate bid for the same for Charlestown, Mass.; class 23, for one motor-driven revolving oilstone and grinder, and alternate bid for the same for Boston; class 24, for one motor-driven, vertical mortiser for New York, and alternate bid for the same for Boston. Schedule 6714, steam engineering, class 111, for one feed pump, one fire pump, several oil pumps, one circulation pump, etc., for Norfolk. Until June 2, schedule 6776, for eight pneumatic jacks for plate planer for Philadelphia; until June 16, schedule 6781, three 2-motor electric traveling cranes for Mare Island; schedule 6782, for one 15-ton and one 40-ton crane, both with 5-ton auxiliary hoist, for Puget Sound; schedule 6783, for one motor-driven, quick-change gear, geared-head lathe 16 in. x 5 ft., for Mare Island.

Bids will be received by the chief of ordnance, War Department, Washington, until May 19, for furnishing 100 firing magnetos, type G-A, for use with armored cable and 28 firing magnetos, type G-A, for use with flexible conduit.

Bids will be received by the general purchasing officer, Panama Canal, Washington, until May 29, under circular 852, class 4, for one railroad track-scale, 42 ft. long, of 150-ton capacity.

Bids were received by the paymaster general, Navy Department, Washington, until May 12, for the following materials:

Schedule 6563, Steam Engineering.

Class 11, Mare Island—Pumps—Bid 26, A $9507.50 and B $9173.50; 50, A $7999.80 and B $7534.80; 57, A $11,019.25; 188, A $9677; 216, A $9478.

Schedule 6564, Steam Engineering.

Class 12, Mare Island, duty paid—Two turbo generator sets, with spare parts—Bid 71, $8171 and $7871 (alt.); 172, $6336 and $5986 (alt.); 186, $9531.70 and $9371.70.

Schedule 6603, Steam Engineering.

Class 14, Brooklyn—Two 900-kilowatt 250-volt generators—Bid 11, $9050; 46, $10,200; 71, $10,922; 186, $23,925.

Alternate Bid A—Commercial speeds with reducing gear—Bid 186, $21,550.

Alternate Bid B—Rental of generators described above—Bid 46, $7100; 71, units.

Schedule 6608, Steam Engineering.

Class 15, Bid A, Brooklyn—Pumps and spare parts for battleship 39, duty paid. Alternate Bid B—Do, duty free—Bid 26, $59,920 (part) and $57,890 (part); 50, A $61,347.25; 52, A units; 188, A $66,490.20 and B $67,761.50; 216, A $65,000.

Schedule 6641, Steam Engineering.

Class 62, Norfolk—Two pipe threading and cutting-off machines—Bid 64, $475 and $617.50; 65, $475 and $617; 108, $474.80; 117, $478 and $620; 121, $453 and $475.

Class 63, Norfolk—One portable oil-burning furnace—Bid 8, $260; 18, $249, $258, and $288; 31, $223.50; 106, $299.50; 117, $255 and $158; 119, $485; 138, 495; 175, $337.

Schedule 6658, Ordnance.

Class 117, Fort Lafayette—One duplex fire pump—Bid 51, $1790; 62, $1534.

Schedule 6633, Steam Engineering.

Class 151, Norfolk—Six electric hoists—Bid 19, $2280; 56, $1560; 64, $2078.25; 82, $1932; 117, $1986 and $1632; 122, $1800; 143, $2070; 197, $1980.

The following bids were received by the chief of the Bureau of Yards and Docks, Navy Department, Washington, May 2, for furnishing a 20-ton, 3-motor electric traveling crane for the Boston navy yard:

Item one, crane and necessary wiring, complete; item two, do, according to bidder's specifications: Bid 217, item two, $5435; 143, item two, $5550; 47, item one, $4475; 117, item one, $5355 and item two, $4868; 180, item one, $4250 and item two, $4120; 176, item one, $4730.

Bids were received by the light house inspector, Tenth District, Buffalo, N. Y., April 18, for one 30-hp. double-drum hoisting engine and outfit, as follows: Bid 48, $935 (accepted); 178, $949; 179, $1100.

The names of the bidders and the numbers under which they appear in the above lists are as follows:

8. American Shop Equipment Company
11. Allis-Chalmers Mfg. Company
18. F. A. Branda & Co.
19. Brown Hoisting Machinery Company
26. Blake & Knowles Steam Pump Works
31. B. N. Best
46. Crocker-Wheeler Company
47. The Cleveland Crane & Engineering Company
48. The Contractors' Plant Mfg. Company
50. M. T. Davidson & Son
51. Deane Steam Pump Company
52. DeLaval Steam Turbine Company
56. Detroit Hoist & Machine Company
57. Dow Pump & Diesel Engine Company
62. Fairbanks, Morse & Co.
64. Fairbanks Company
65. Frevert Machinery Company
71. General Electric Company
82. Hoisting Machinery Company
106. Monarch Engineering & Mfg. Company
108. Manhattan Supply Company
117. Manning, Maxwell & Moore
119. Mirces Fuel Oil Equipment Company
121. D. Nast Machinery Company
122. National Electrical Supply Company
138. Production Engineering Company
143. Pawling & Harnischfeger Company
172. Terry Steam Turbine Company
175. Tate-Jones & Co.
176. Niles-Bement-Pond Company
178. Lidgerwood Mfg. Company
179. J. S. Mundy
180. The Exeter Machine Works
186. Westinghouse Electric & Mfg. Company
188. G. & J. Weir, Ltd.
197. Yale & Towne Mfg Company
216. Warren Steam Pump Company
217. Whiting Foundry Equipment Company

The Logan Iron Works, Commercial street, Greenpoint, Brooklyn, N. Y., was closed down permanently May 6. It had been for over half a century a manufacturer of buoys, steel chimneys, boilers, etc. Poor business through changing conditions is given as the cause that reduced the payroll from over 1000 men to less than 60. W. J. Logan and Frank Logan, the present owners, will dispose of the property; Charles J. Schluter having charge of the sale.

With vanadium steel dies 90,000 punchings are said to be secured in making gaskets from unpickeled sheet steel. The best production formerly obtained with ordinary tool steel dies without regrinding was 40,000 punchings.

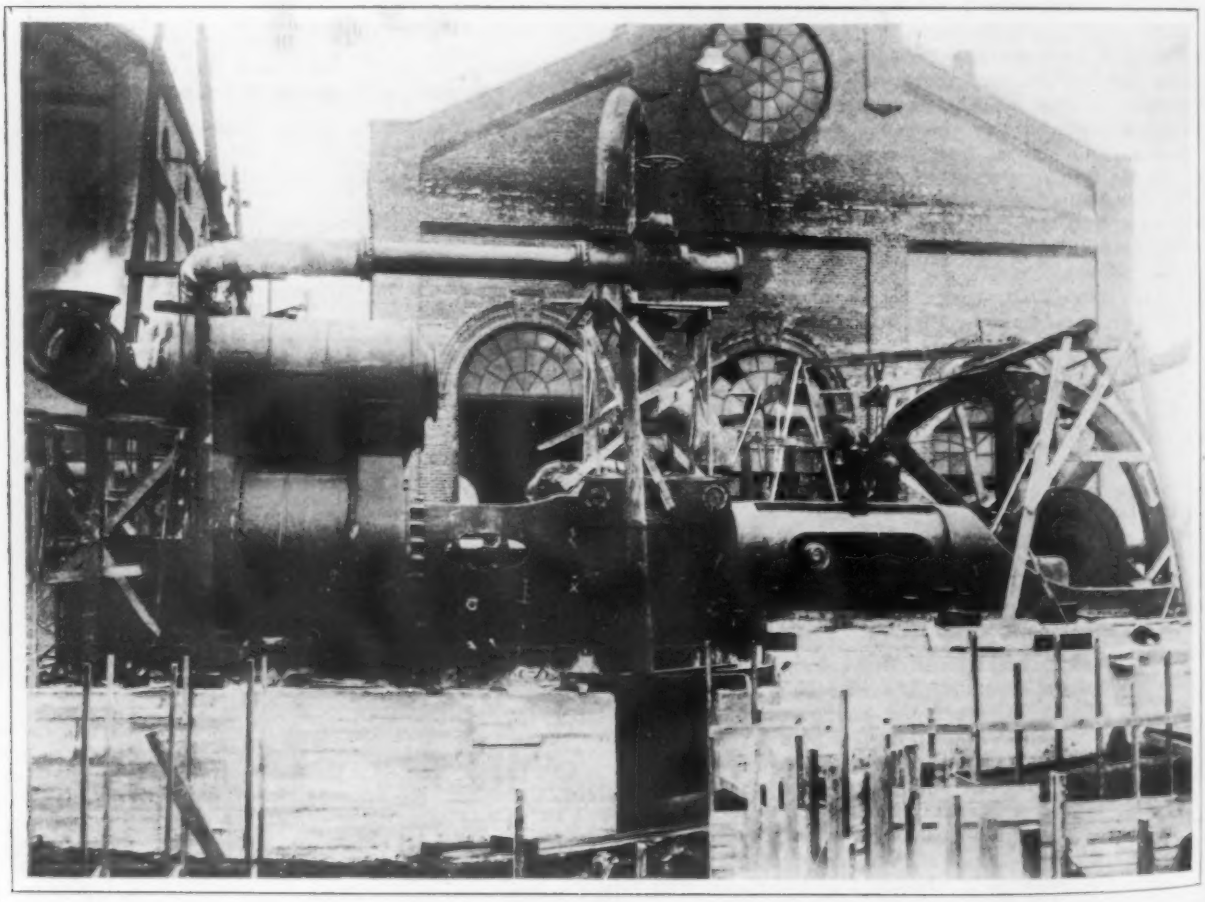
ERECTING BLOWING ENGINES

Quick Results in Installing Large Units for the Woodward Iron Company

The erection and operation of large blowing engines before the building to contain them has been erected is notably exceptional, and the case in point is that of two blowing engines furnished in December last by the Mesta Machine Company, Pittsburgh, Pa., to the Woodward Iron Company, Woodward, Ala. In *The Iron Age* January 22, 1914, there appeared an illustrated description of the two 900-ton blowing engines, built by the Mesta Company. The first engine was built in the short period of 38 days, and both engines were completed in 59 days. This is believed to be the world's record in building large engines, and what is thought to be another record in the erection of engines has been accomplished at the steel plant of the Woodward Iron Company.

On Tuesday, December 23, 1913, the Mesta Machine Company notified the Woodward Iron Company that the first engine was being shipped that day from its plant at West Homestead. The latter company was anxious to start its new blast furnaces, and made every effort to erect the engines in the shortest time possible with the facilities available, but at this time nothing had been done in the way of preparing the foundations, as it was expected that a much longer time would be required by the builders to complete the engines. On this account, the ground where the engines were to be placed was covered by a large cinder pile, and as soon as word had been received that the first engine was completed and was being shipped, and that the second one would follow shortly, work on the foundation was started. On the following Monday evening, December 29, 1913, the foundation was completed and the first casting was in position.

As no overhead cranes were available for erecting purposes, it was necessary to resort to makeshift methods in order to assemble the engines with the desired speed. A railroad track was laid alongside and at each end of the foundation, and a 25-ton railroad crane with an arm of 40-ft. radius was installed. The crane was used, not only for erecting purposes, but for various duties, including repairs about the plant, so that at times the erectors would be deprived of its use, and in these cases had to utilize various other methods of handling the material. The difficulties encountered during erection are well shown by the method of moving the crane. In order to get from one end to the opposite end of the foundation, a distance of a few yards, it was necessary for the crane to travel a distance of two miles. This was on account of the fact that special tracks were laid at each end of the foundation connecting with the track already laid. There was no crossover connecting the two sets of tracks nearer to the foundation than one mile, and to move the crane from one end of the foundation to the other it had to be moved one mile before getting to the crossover, and one mile back, making a distance of two miles the crane was moved. In order to place the extra heavy pieces a skidway built up of heavy rails was improvised from the car to the foundation. The heavy castings were then skidded into position above the foundation and lowered by jacks.



One of Two Large Mesta Blowing Engines, Being Erected at the Plant of the Woodward Iron Company

To facilitate the erection of the air lines to the furnaces the air cylinders and receivers were placed in position as soon as possible. However, after this was done, it was impossible to use the one yard crane as before because of the interference with

the receiver. An old crane with a useless boiler was then pressed into service and a live steam line connected to it. A cableway was strung from this crane to another placed at the opposite end of the foundation, and in this way it was possible to handle the valves and other parts of the engine without striking the top of the receiver. When the pistons were ready to be placed, it was impossible to get close enough to use the cranes. The pistons were, therefore, put on blocks and rolled into position.

The facilities at hand for erection were very meager, but handicapped as the erectors were, it was only three weeks after the first piece was put on the foundation that steam was admitted to the engine.

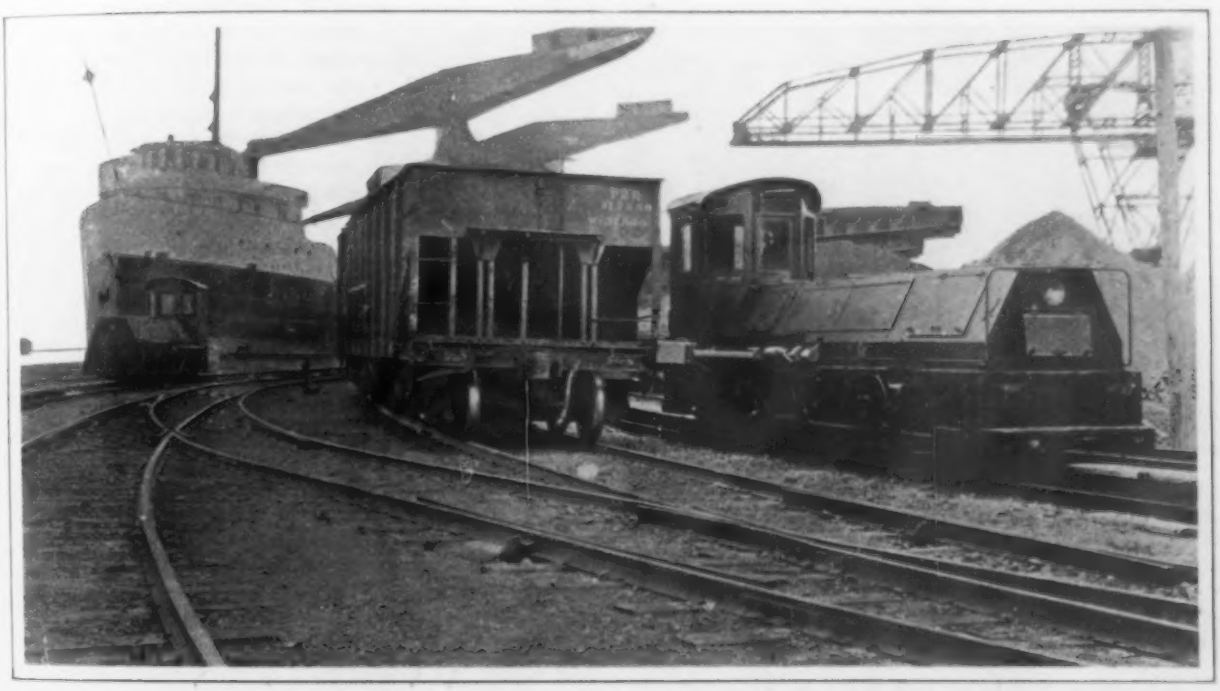
When the first engine was started the steam pressure available was only 60 lb. Before starting the second engine, however, part of the old engine was shut down, and by further changes the steam pressure was raised to 120 lb. The first engine operating at 60 r.p.m. is used for blowing a new 500-ton furnace. Immediately after starting it ran for seven days without stopping, when it was shut down during a couple of hours for slight adjustments. The foundation for the second engine could not be started until the complete erection of all heavy parts of the first engine, since the railroad tracks were laid over the ground where the foundation was to be located. However, as soon as the last large piece of the first engine was in place, the railroad tracks were moved and the foundation for the second engine was begun. The erection of the second engine was attended by as many difficulties as that of the first. When the last piece was in place the engine was started and run for only 6 hr. before it was connected to the furnace. The engines operated in the open air without shelter for three weeks. During this time there were several rains and at one time a snowfall of 3 in. One of the difficulties encountered was the breaking of the expansion joint on the exhaust line. This allowed the steam to exhaust directly underneath the engine, which was enveloped in a cloud of steam for three days before the leak could be stopped.

The boiler house was located near the engines and cinders from the ash heap were blown over them from time to time. However, this was later eliminated to some extent by stretching canvas in front of the engines. As soon as was expedient a small shed was erected, which protected them from the weather until the new power house could be erected.

That these engines have given satisfaction is shown by the fact that the Woodward Iron Company has ordered two more to be duplicates of the ones completed.

Electric Locomotive for Ore Dock Use

Three locomotives of rather unusual design have been furnished to the Pennsylvania Lines West for handling cars on the ore docks at Cleveland, Ohio. The locomotives do not run on the same tracks as the cars they handle, but on a set of parallel tracks, having a gauge of 42 in.



A Special Type of Electric Locomotive Which Has Been Built to Handle Cars on Ore Docks

The locomotives were built jointly by the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., and the Baldwin Locomotive Works, and weigh 25 tons. The frames are of the standard bar steel type, which, it is emphasized, gives strength and at the same time renders the interior readily accessible. The power is obtained from two rails located between the running rails. A wood covering is employed to protect the pair of power rails.

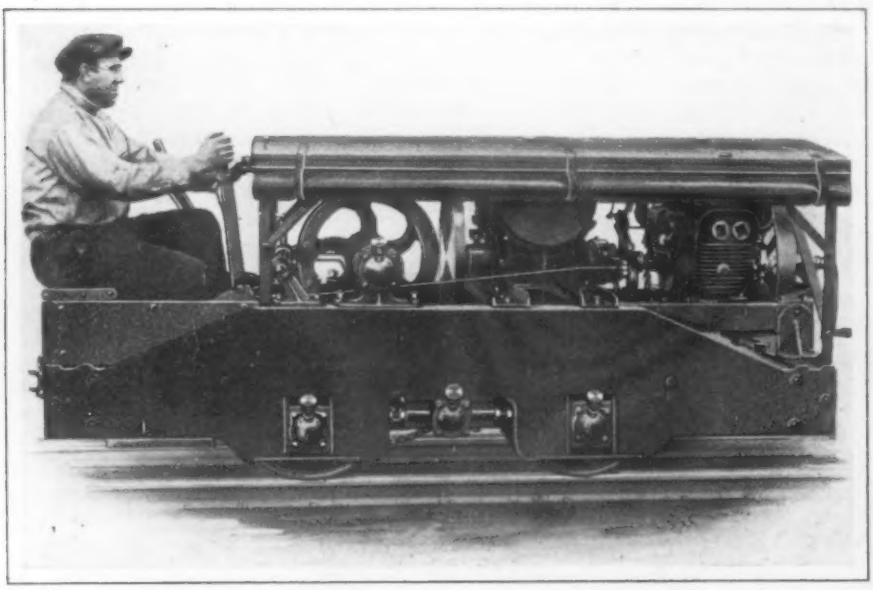
As the locomotive runs on a parallel track, couplings are not employed for attaching the locomotives to the cars. On each side of the locomotive there is an arm which is lowered by compressed air, the movement being regulated by a control valve in the cab. This arm acts as a pusher, as is brought out in the accompanying engraving. It is stated that with these locomotives single cars or entire trains can be handled readily, and cars can be shifted or cut out from trains easily and rapidly.

The last fortnightly bulletin of the American Railway Association showed a net surplus of 228,879 idle cars on the lines of the United States and Canada on May 1, an increase of 16,000 over the number reported on April 15. The surplus of box cars on May 1 was 74,597, and of coal cars 100,370.

NEW INDUSTRIAL LOCOMOTIVE

Friction Drive from a Two-Cylinder Gasoline Engine—All Four Wheels Drivers

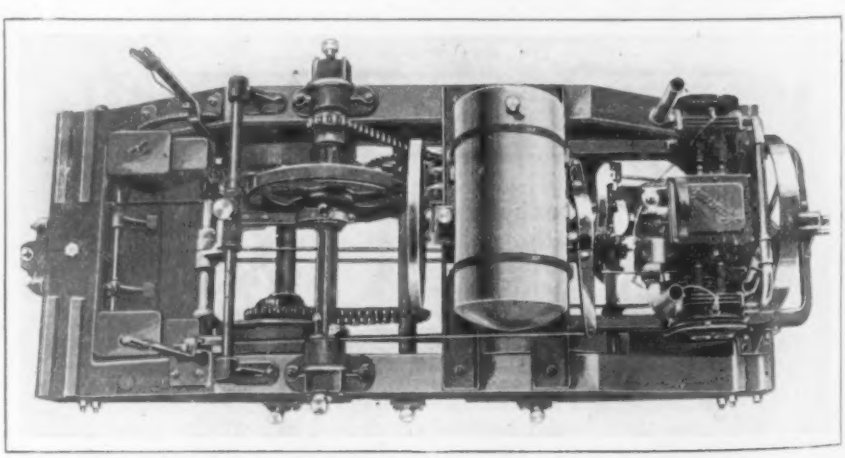
A new type of industrial gasoline locomotive, an important feature of which is that it has a friction drive, has been brought out by the J. D. Fate Company, Plymouth, Ohio. This is the first industrial locomotive to which this form of transmission has been applied. The drive is through a friction disk that comes in contact with a fiber wheel. Power is transmitted from the fiber wheel shaft through a sprocket wheel and chain to a jackshaft on which are two sprockets that drive chains from this shaft to the front and rear axles to give power to both axles or all four wheels. The drive is clearly illustrated in the engraving showing the working mechanism.



A New Type of Gasoline Industrial Locomotive Equipped with a Friction Drive

The friction disk is brought into contact with the fiber wheel by a lever, the forwgard and backward movement of the disk, and its shaft being only ⅛ in. The end thrust is taken care of by double ball end thrust bearings. The engine has a flexible spring steel connection with the friction disk shaft so that the disk cannot exert any strain upon the engine. All speeds and reversal are obtained by simply shifting the fiber wheel across the friction disk by the speed changing control. The friction drive is designed with liberal proportions and has heavy stiff shafting and high-grade bearings. Hyatt roller bearings are used throughout, except the end thrust bearing, which is a New Departure ball bearing. These bearings have a low coefficient of friction and require little attention. The Hyatt bearings are lubricated with grease and the ball bearings run in an oil bath. The friction drive does away with all clutches, gears and complicated levers, providing a flexibility it is claimed that is not possible in a geared transmission. In starting the locomotive with a train of cars the operator can allow sufficient slippage until the train is in motion and then by applying more pressure on the control lever the slipping of the fiber wheel on the disk is stopped. With a gear-driven locomotive there is danger that the extra strain in starting the train of cars will break the teeth of the gears or stop the engine. It is stated that the fiber used on the fiber wheel will last a long time and that it can be easily replaced at a small cost, the upkeep being less than the expense of grease for lubricating a geared transmission. The operation of the locomotive is just as efficient forward or backward, its speeds and power being the same in either direction.

The locomotive has a heavy two-piece cast-iron frame, which is very rigid, in order to keep all bearings mounted on the frame in perfect line, the weight being sufficient to give tractive power. All shafting is of high carbon steel of sufficient proportions to withstand strain. The wheels are forced on the axles and keyed. The larger sprockets are split and clamped as well as keyed to their shafts. The smaller sprockets are bored to Morse No. 7 tapers and are held in place by clamp collars and Woodruff keys. These sprockets are of steel, the smaller ones being hardened. The wheels are of a special mixture to give a hard, good wearing tread. The drive from the friction transmission to the wheel is by high-grade Diamond steel roller chain of 1¼ in. pitch. The engine is a 20-hp. Monarch, of the two-cylinder opposed air-cooled type, with Bosch magneto. Brakes and sanders are provided for both front and rear wheels. All bolts are locked with either castellated nuts or spring lock washers. The locomotive is furnished with or without a cab. All working machinery is covered and curtains are provided to be let down when it is standing out doors. Important claims made for this type of locomotive are that it is simple in construction and operation and foolproof.



Plan View of the Locomotive Showing the Arrangement of the Engine and the Drive

The locomotive has a draw bar pull of 800 lb. at 5 miles per hr. and its hauling capacity, allowing 40 lb. to ton draw bar pull, is 20 tons on a level

grade and 6 tons up a 4 per cent. grade. Its speed range is 3½ to 10 miles per hr.

The principal dimensions and specifications of the locomotive are given in the following table:

Weight, depending on gauge, tons	2½ to 3
Wheelbase, in.	38
Standard sizes of gauge, in.	24 to 36
Diameter of wheels, in.	18
Wheel tread, in.	3¼
Gasoline capacity, gal.	20
Size of axles, in.	2⅞
Size of disk, in.	22
Size of fiber wheel, in.	22 x 1¾

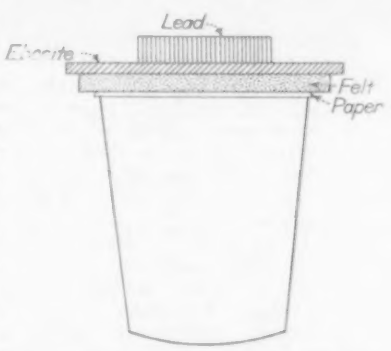
It is stated that the amount of gasoline required to run the locomotive most of the time during the day is from 4 to 6 gal. per day. During a recent test lasting seven days 2510 tons of material was hauled and 41 gal. of gasoline and 7 gal. of lubricating oil were consumed, or less than 6 gal. of gasoline per day. During this test material was hauled that had required three horses. Three days of the seven were wet, making the rails slippery. With better weather conditions it is believed that the fuel consumption will be reduced. The amount of lubricant used was rather high for the reason that the locomotive was a new one.

SULPHUR IN IRON AND STEEL*

New Colorimetric Method for Its Estimation, as Used at the Cockerill Works

BY G. MISSON

Colorimetric processes for the estimation of sulphur have hitherto been prone to errors arising from the sample taken being too small, also from the fact that the acid employed for solution has been too diluted, and has not driven off the whole of the sulphur as sulphuretted hydrogen. Further, these methods have been inapplicable to the analysis of pig irons.



Apparatus for Calorimetric Estimation of Sulphur

The process which since October, 1910, has been employed at the laboratory of the Cockerill Company, Seraing, Belgium, is equally serviceable for the analysis of basic and acid pig irons, and for that of steels. The amount taken for assay is 1 gram of the sample, and solution is effected in the cold by hydrochloric acid of 1.14 specific gravity, made by mixing 7 liters of concentrated hydrochloric acid with 3 liters of water.

The reagents and apparatus required for the estimations are: 1. A piece of white felt 10 cm. square and 5 mm. in thickness. 2. Slightly conical glass vessels with thick rims, 80 mm. in diameter and 95 to 100 mm. in hight (ordinary No. 4 ice-glasses are used). 3. Paper, impregnated with a solution obtained as follows: Take 10 g. of pure, powdered arsenious anhydride and 30 cc. of concentrated hydrochloric acid; shake; add about 500 cc. of boiling water, heat until dissolved, and make up to 1 liter. In this solution leaves of filter paper are soaked (Schleicher No. 598 in reams). They are allowed to drain over glass rods. The paper while still moist is cut up into pieces 10 cc. square and preserved, damp. 4. Pieces of ebonite, 10 cm. square and 1 or 2 mm. in thickness. 5. Discs of lead weighing about 500 g. 6. Benzine (specific gravity 0.710). 7. Steels, basic pig irons, and Bessemer pig irons standardized as to their sulphur contents.

*From a paper presented at the London meeting of the Iron and Steel Institute, May 7 and 8.

DETAILS OF THE METHOD

The sample, weighing 1 gram, is introduced into the conical vessel. Ten cc. of benzine and 50 cc. of HCl are added, and the vessel covered over by means of a piece of the arsenious paper, over which is placed a piece of felt, and then the square of ebonite, held down by the lead disc. The H_2S and H evolved escape uniformly through the entire surface of the paper. The H_2S is decomposed, and leaves a yellow stain. The yellow coloration is distributed very evenly over the whole surface, owing to the presence of the piece of felt. The standards are tested simultaneously with the samples, and the tints are compared by transmitted light. The following standards are employed:

For steels	0.035 and 0.065 per cent. sulphur
For basic pig irons	0.05, 0.12, and 0.17 per cent. sulphur
For Bessemer pig irons	0.05, 0.12, and 0.17 per cent. sulphur

The duration of a test depends, in the case of steels, on the size of the drillings subjected to analysis. With convenient-sized drillings, and with powdered pig irons, the time required may in certain cases not exceed an hour, and a single operator can carry out a large number of operations, as these require, so to speak, no manipulation whatever apart from the weighing out. This process is particularly to be recommended when there are a great number of estimations to be made. In the laboratory in question 100 per day is an average number. Once started, the tests should not be touched. Any agitation, by breaking up the film of benzine floating on the acid, will produce stains on the surface of the paper.

Below are given a number of the results obtained on steels by this new process compared with those obtained by the gravimetric and volumetric processes ordinarily employed:

No. of steel	New method, per cent.	Evolution method and titration of the cadmium sulphide by iodine and hyposulphite, per cent.	Old method of weighing barium sulphate, per cent.
9057	0.07	0.07	0.065
9072	0.032	0.03	0.028
9256	0.048	0.046	0.045
9295	0.035	0.036	0.037
396	0.048	0.05	0.043
72	0.027	0.028	0.023
565	0.038	0.04	0.038
374	0.04	0.04	0.038
613	0.025	0.03	0.026
650	0.047	0.044	0.049
665	0.04	0.038	0.037
741	0.048	0.046	0.05
34	0.028	0.026	0.026
821	0.333	0.036	0.036

[Equally concordant results were obtained on pig irons, the original paper having a long table of comparisons.]

The April report of the Industrial Commission of Wisconsin shows that payments of compensation to Wisconsin workmen injured through industrial accidents now average in excess of $1,000,000 per annum. During April the commission disposed of 1058 cases in which compensation was paid to injured workmen or their dependents. The amount paid to employees was $67,175.61, and the expense for medical, hospital and surgical services, which is also paid by employers, amounted to $33,587.80, making a total relief furnished to injured men of $100,762.41. The administration cost was only $900, or less than one per cent. of the total disbursement.

The Welding Materials Company, electric welding equipment, has removed from 149 Broadway to the Engineering Building, 114 Liberty street, New York.

Trade Publications

Duplex and Centrifugal Pumps.—Advance Pump & Compressor Company, Battle Creek, Mich. Two collections of loose leaf circulars. One deals with a line of duplex steam and power pumps for a great variety of uses. The other treats of a line of centrifugal pumps that are built in both the vertical and horizontal types for belt or direct-connected drive. Each of the different styles of pumps covered is given a single sheet with an engraving on one side and brief description and condensed specification table on the other. A number of tables of useful information are also included.

Railway Supplies and Equipment.—Harry Vissering & Co., Inc., Chicago, Ill. Bulletin No. 97. Illustrates a line of locomotive equipment which includes sanders of various types, bell ringers, metallic packing, valves, a sand drier and flexible sand pipes, a brake step and a blower valve. Brief descriptions of the various appliances are given under the engravings, together with a list of the equipment furnished with each. A number of illustrations of repair parts are also included.

Boilers.—Kewanee Boiler Company, Kewanee, Ill. Booklet entitled "Cutting Coal Costs." Is not an attempt to tell what coal should be bought, but is rather an effort to show how all the heat contained in the coal used can be utilized for steam making purposes. After a discussion of the chemistry of combustion, a brief description of a smokeless firebox boiler, having a down draft and a double grate is given, together with a sectional drawing of the boiler showing the setting.

Drill Chucks.—E. Horton & Son Company, Windsor Locks, Conn. Circular 12-A. Pertains to the Horton-Morrow hand-operated ball bearing drill chucks. The special features claimed for the chuck are a saving in time, a positive grip and quick release, a saving of tools and accuracy. Views of the chucks showing its construction are given and mention is made of the different sizes of arbors and steel jaws that can be supplied.

Grinding Machines.—Heald Machine Company, Worcester, Mass. Pamphlet. Embodies a brief history of the company from its inception in 1830 to the present time and illustrations of the company's line which includes internal, cylinder, ring and drill grinding machines and magnetic chucks. Each of the machines is given on a separate page with a brief statement of the class of work which it is designed to handle.

Feed Water Heaters.—Elliott Company, 6910 Susquehanna street, Pittsburgh, Pa. Bulletin D. Calls attention to the Pittsburgh feed water heater, for which the special advantages of simplicity, convenience of operation and low cost of installation are claimed. The oil separator is placed within the heater and can be removed when the surface becomes fouled with grease. Illustrations and brief descriptions of the heaters, which are made in vertical-rectangular, vertical-cylindrical, horizontal and twin types, are given. Following the description of these heaters brief descriptions are given of the various parts of the heaters, the text being supplemented by a number of halftone engravings. Instructions for connecting two heaters in multiple are given and mention is made of a number of accessories.

Engines.—Wheland Company, Chattanooga, Tenn. Bulletin EE. Refers to a line of engines, which include the side crank balanced valve, automatic, self-contained balanced valve, center crank balanced valve, horizontal center crank and vertical types of engines. All of these are illustrated and briefly described. Tables of the horsepower developed and brief specifications are included. A list of repair parts numbered to correspond with a drawing is given, and mention is made of vertical and horizontal boilers that can also be supplied.

Key Seating Machines.—Chattanooga Machinery Company, Chattanooga, Tenn. Circular. Devoted to a motor-driven key seating machine, which is built in two sizes, with a stroke of 23 in. The smaller machine will cut key seats ranging from 1/16 to 2 in. in width, while the maximum capacity of the larger machine is ½ in. wider. These machines can also be furnished with belt drive, if desired.

Oxy-Acetylene Welding and Cutting.—Vulcan Process Company, Inc., Minneapolis, Minn. Pamphlet. Points out the advantages of the Vulcan process of welding and cutting metals. After a brief discussion of the materials that can be welded and the application of the process, the several types of plants built are illustrated and described.

Horizontal Boring and Drilling Machines.—Betts Machine Company, Wilmington, Del. Catalogue No. 2614. Covers a line of horizontal boring and drilling machines and their attachments exclusively. The special points of advantage, such as the absolute control by the operator from one position, the production of accurate work, powerful drive, wide range of drilling and boring feeds, and the facility with which the table can be removed and large work fastened directly to the slotted bedplate, are touched upon, after which illustrations of the machines are given, with brief descriptions on the facing pages. Mention is made of the different attachments which can be supplied, and there are some views showing the different arrangements of motor drive that can be furnished.

Crane Signal Gong.—G. C. Reiter, Canton, Ohio. Folder. Describes and illustrates a pressed steel foot-operated gong for use by crane operators. The gong has no springs and few parts, and is designed to be attached to the floor of the operator's cab.

Cold Drawn Steel.—National Drawn Steel Company, East Liverpool, Ohio. Booklet. Lists the company's line of cold drawn steel products, and illustrates a large number of special shapes. Among the products listed are drill and dental octagon rods, polished watch and needle and coiled cast-steel wires and tool, alloy and needle bar steels. The booklet contains a list of standard drill rods, tables for computing the weights of drill rods and round steel wire, the weight per lineal foot, standard price lists and other information.

Grinding and Pulverizing Machinery.—Raymond Bros. Impact Pulverizer Company, 1315 North Branch street, Chicago, Ill. Mailing card. Calls attention to the company's pulverizing air separating system for grinding and separating many different kinds of materials. A testimonial letter is reproduced, which calls particular attention to the fineness of the product and the freedom from dust in the packing department, which are secured by the use of this machinery.

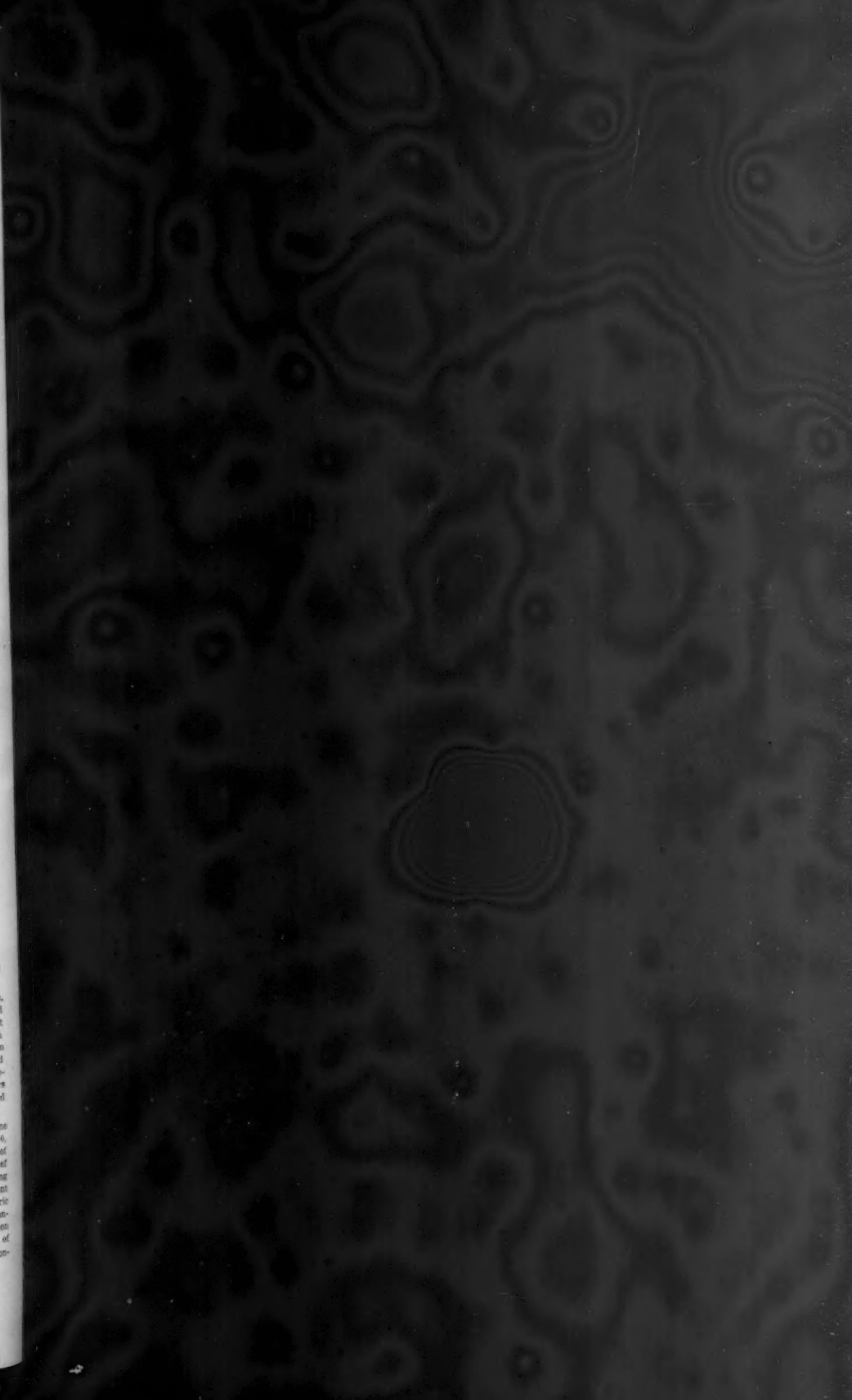
Cast-Iron Pipe.—McWane Pipe Works Department of Lynchburg Foundry Company, Lynchburg, Va. Booklet. Classifies and tabulates in convenient form a full line of standard cast-iron pipe and special castings. Standard specifications for cast-iron water pipe are given, followed by drawings and dimension tables of the standard bell and spigot joints and various fittings for both gas and water pipe. A number of tables of useful information, including the cost of pipe laying, the flow of water in pipes and the loss of head through friction, etc., are included.

Clay Working Machinery.—American Clay Machinery Company, Bucyrus, Ohio. Catalogue No. 90. Size, 8½ x 10¾ in.; pages, 515. Relates to an extensive line of clay working machinery, including brick, pottery and cement machines, brick setting machinery, dryers of all kinds and clay working appliances. All of the various machines and appliances are illustrated and described, and in a number of cases there are views of the different parts and line diagrams.

Steel Cars.—Pressed Steel Car Company, Farmers Bank Building, Pittsburgh, Pa. Loose leaf catalogue. Gives illustrations and brief descriptions of a number of different types of steel cars, for both freight and passenger service. A number of mine cars and a miscellaneous line of products, such as trucks, bolsters, etc., are also shown.

Forging Machine.—National Machinery Company, Tiffin, Ohio. Circular. Illustrates and describes the construction of the bed frame of the company's line of forging machines, which is made of a steel casting reinforced by under-ribbing that extends for a considerable distance below the floor line. An engraving of the frame is shown, while two drawings illustrate the contrast between the new and the old types.

Belt Lacing and Fastener.—Flexible Steel Lacing Company, 522 South Clinton street, Chicago, Ill. Two pamphlets. The first deals with a belt fastener in which the teeth are set edgewise to the strain, and contains directions for applying it. The other treats of a steel belt lacing, which is adapted for use on leather, rubber, cotton or canvas-stitched belting. It is a separable lacing hinging on a rawhide or sectional steel rocker pin and is claimed to give a perfectly flexible joint.

Volume and Pressure Recorders.—Herman Bacharach, 14 Wood street, Pittsburgh, Pa. Catalogue B. Concerned with a line of volume and pressure recorders, which consist of a cylindrical vessel partly filled with water in which a hollow bell carrying a float is immersed. A brief description of the apparatus is given, together with a number of line and halftone engravings of the different types that can be supplied. A description of the principle upon which the recorders operate and reproductions of charts that have been obtained with them are included.

Hoists and Traveling Cranes.—Shepard Electric Crane & Hoist Company, Montour Falls, N. Y. Bulletins Nos. 60, 61, 503 and 504. The first presents a number of views of monorail hoists for use in various types of plants. A brief description of each installation is given under the engraving and a description of the hoist, with engravings of the different parts, is included. Bulletin No. 61 covers a line of electric traveling cranes and contains a brief description of the construction of the cranes and a large number of installation views. Nos. 503 and 504 are concerned with the details of construction of a line of electric and monorail hoists and contain a number of illustrations of the different types.